AMERICAN JOURNAL OF ORTHODONTICS

OFFICIAL PUBLICATION OF
THE AMERICAN ASSOCIATION OF ORTHODONTISTS,
ITS COMPONENT SOCIETIES, AND
THE AMERICAN BOARD OF ORTHODONTICS

Editor-in-Chief

H. C. POLLOCK, ST. LOUIS, MO.

Sectional Editors

CHARLES R. BAKER, Evanston, Ill.
HENRY COSSITT, Toledo, Ohio
JOSEPH D. EBY, New York City
WILLIAM E. FLESHER, Oklahoma City, Okla.
HENRY F. HOFFMAN, Denver, Colo.
STEPHEN C. HOPKINS, Washington, D. C.
JAMES D. McCOY, Beverly Hills, Calif.
OREN A. OLIVER, Nashville, Tenn.

Associate Editors

DENTISTRY FOR CHILDREN
WALTER T. McFALL, Asheville, N. C.

ABSTRACTS AND REVIEWS
J. A. SALZMANN, New York City

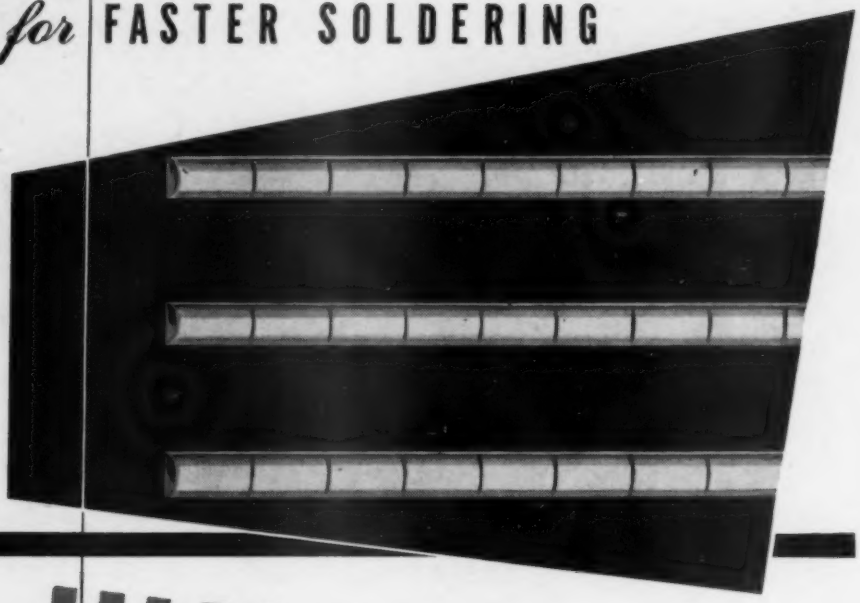
PUBLISHED BY THE C. V. MOSBY COMPANY, ST. LOUIS 3, U. S. A.

TABLE OF CONTENTS ON PAGE 2

Copyright 1953 by The C. V. Mosby Company

Vol. 39 **MARCH, 1953** **No. 3**

precision FORMED
accurately SEVERED
ready for FASTER SOLDERING



WILLIAMS

POST MATERIAL

sectional half round

This widely accepted post material greatly facilitates soldering of post to arch wire. Accurately cut into units of .10", .09" and .08" each to conform to tube depth. This post material retains sufficient metal between each unit for ease of handling. Once soldered, the post is readily severed from the remaining strip. Made of special, non-tarnishing gold-platinum alloy. Supplied in 6" strips.

WILLIAMS *foremost in orthodontic material*

Williams orthodontic products comprise a wide range of standard and special designs. May we send you our illustrated booklet "Aids To Your Orthodontic Technic"? Write:

WILLIAMS ALLOYED INDUCTIVELY UNIFORMLY SUPERIOR *Gold Refining Co., INC.*

BUFFALO 14, N.Y. FORT ERIE N., ONT • HAVANA, CUBA

Vol. 39, No. 3, March, 1953. American Journal of Orthodontics is published by The C. V. Mosby Company, 3207 Washington Blvd., St. Louis 3, Mo. Subscription price: United States, its possessions, Pan-American Countries, $10.00; Canada and Foreign, $11.00 Entered as Second-class matter, January 14, 1915, at the Post Office at St. Louis, Missouri, under the Act of March 3, 1879. Printed in the U. S. A.

BAKER
ORTHODONTIC WIRES

MADE WITH COMPLETE SCIENTIFIC CONTROL OF ATMOSPHERE, MELTING AND ANNEALING TEMPERATURES

Q-A WIRE

Q-A is our best temperable platinum colored wire! Made in all gauges for all purposes. Tough, hard, never brittle from heat or overworking. For fine springs especially. Everyone who has tried it likes it.

HIGH FUSING

High Fusing, our best non-oxidizing gold colored wire. For universal use. Where you need the highest quality light gold colored wire.

THREE PER CENT

For all purposes. Phenomenal strength. Low fusing point makes it easy to ball. Nice resilience without heat treating. Should not be put in tempering device because of its low elongation when hardened.

SUPER ORALIUM

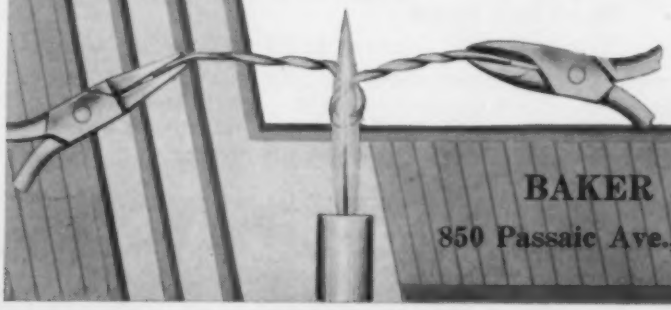
Super Oralium for bending at red heat. Splendid for shaping over model at red heat. This does not injure its remarkable properties. No acid affects it. Tempers when cooled slowly in air.

ORALIUM

Oralium for economy. Lowest priced good temperable wire. High palladium content. Neutral color. Do not over temper nor leave in contaminated hydrochloric acid. Great tensile strength when cooled slowly. Light in weight.

ORTHOCLASP

Orthoclasp, 100% precious metal, pure platinum colored wire. Heat of your flame won't melt it nor will it oxidize nor become brittle. You can neither temper nor soften it. No other wire like it. Many men use it universally, others for body wire and retainers only.



Let us send you self-addressed order pad, literature and prices.

BAKER & CO., INC.

850 Passaic Ave., East Newark, N. J.

CONTENTS FOR MARCH, 1953

American Journal of Orthodontics

Original Articles

A New Approach to the Analysis and Treatment in Mixed Dentition. Silas J. Kloehn, D.D.S., Appleton, Wis. ---- 161

Malocclusion in Androgen-Treated Monkeys. Bert G. Anderson, D.D.S., C. M. Seipel, D.M.D., and G. vanWagenen, Ph.D., New Haven, Conn. ---- 187

Studies of Dentofacial Morphology. II. Orthometric Analysis of Facial Pattern. William A. Elsasser, A.B., B.S., D.D.S., Washington, D. C. 193

Predetermination of the Adult Face. Raymond M. Curtner, D.D.S., San Francisco, Calif. ---- 201

The Increased Gonial Angle in Micrognathism. Leonard R. Rubin, M.D., New York, N. Y. ---- 218

Reports

Report of the Nomenclature Committee, American Association of Orthodontists, 1952 ---- 223

Report to the American Association of Orthodontists by the American Board of Orthodontics, 1952 ---- 226

Orthodontic Abstracts and Reviews

Orthodontic Abstracts and Reviews ---- 227

News and Notes

News and Notes ---- 231

Officers of Orthodontic Societies

Officers of Orthodontic Societies ---- 240

ORTHO-IMPRESSION

TRADE MARK

POWDER

STABLE—NON-CRITICAL—FLASH SET

Economical

Carton of 12 1-lb. Cans	$25.50
Carton of 6 1-lb. Cans	14.00
Sample 1-lb. Can	3.25

An extremely STABLE impression material so formulated to require no OVERLY CRITICAL TEMPERATURES in its use. A spatulating time of ¾ to one minute gives an ultra smooth, creamy mix that reproduces the most minute detail and will FLASH SET in about two minutes. ORTHO-IMPRESSION POWDER sets to a hydro-Colloidal firmness—resilient—not hard and brittle. Permits the removal of the model without breaking Anterior Teeth. Resilient enough to permit the pouring of a second and third model from one impression.

SARDA-CHROME

TRADE MARK

A stainless, non-magnetic, iron-free alloy specially formulated to meet the rigid specifications so necessary for good orthodontic appliance construction.

SOLDERS as easily as precious metal — WELDS perfectly — conforms to any technique.

Band Material . . . . Properly annealed for ease of manipulation—excellent edge strength for quick seating—burnishes beautifully, for perfect occlusal fit.

125 x 003 125 x 004
150 x 003 150 x 004
180 x 003 180 x 006

All popular sizes—8-foot roll **$2.00**—100-foot coil **$15.00**

Arch Wires . . . . . Furnished in the proper temper for ease in forming an arch but with the necessary tensile strength for maximum resistance to arch fatigue. In straight 1-foot lengths.

.040 .036 .032
.030 .028 .025
.022

Each size packed 25 1-foot straight lengths **$2.00 per pkg.**

Round Buccal Tubes—.045x¼—.040x¼—.036¼—.022x¼—package of 50 tubes **$2.45**
Edgewise Buccal Tubes (sheaths) .022x.028x¼—.022x.028x⅛ package of 50 tubes **$2.45**
½ Round Lingual Tubes and shafting to match; package of 25 tubes and shafting **$2.45**
End Sections for twin arch—1⅛ inch long—.0225x.035—.0225x.040, package of 50 **$2.45**
Edgewise Eyelets—a complete circle with an .015 opening, package of 100 **$2.00**
Sarda-Chrome Solder—a universal non-precious solder—28 or 25 gauge, 3 dwt. **$1.00**
Sarda-Chrome Flux—a superior flux for Sarda-Chrome or Stainless Steel **$1.00**

HEAD CAPS FOR EXTRA ORAL ANCHORAGE

Sturdily constructed of extra strong inch wide grosgrain ribbon with a fine silk-like finish. Lined at the seams with smooth felt for additional comfort.
Made in 6 head sizes for good fit, 21, 21½, 22, 22½, 23, 23½—**$1.50** each **$14.00** doz.

LABIAL BOW FOR EXTRA ORAL ANCHORAGE

Constructed to permit the outer bow to rotate in a tube to reduce Torque. Small —Medium—Large. Made of Stainless Steel. An inner arch of .040 fastened to an outer bow of .040 ——— each **$2.50**

An inner arch of .045 fastened to an outer bow of .059 for extra rigidity ——— each **$3.50**

Betta Orthodontic Supplies

33 WEST 60th STREET • NEW YORK 23, N. Y. • Circle 5-5998-9

Unitek Precision Attachments
for the Technique of Your Preference
In any profession there are differences of opinion as to technique. But orthodontists universally agree that to attain maximum operative efficiency and performance, all attachments and materials must necessarily be of the highest standards of technical perfection.
Precision is the byword at UNITEK, every Perma-Chrome attachment is held to consistent and precise tolerances . . . materials are all of unexcelled quality.
UNIVERSAL
TWIN-ARCH
HORIZONTAL LINGUAL
EDGEWISE
McCOY
MOLAR
Write for your requirements
Precision Wire, Band Material, Tubing, Coil Springs and all other essential orthodontic materials.

Unitek
CORPORATION

275 NO. HALSTEAD AVENUE, PASADENA 8, CALIFORNIA.

YOUR PATIENTS

DESERVE THE BEST . . .

. . . The TOOTH POSITIONER

PATENT NO. 2531222

MANUFACTURED EXCLUSIVELY BY

LA PORTE TOOTH POSITIONING LABORATORIES

P. O. BOX 73 LA PORTE, INDIANA

ALSO PRODUCERS AND SUPPLIERS OF . . .

SPECIAL ACTIVATING AND STABILIZING EDGEWISE ARCHWIRE • ALSO PRECISION BUCCAL SHEATH MATERIAL • PLASTIC CERVICAL TRACTION TUBES • MODEL STORAGE BOXES • SEPARATING WIRE • RUBBER MOLD BASES • POSITIONER CARRYING CASES WITH PATIENT INSTRUCTIONS • LIGATURE WIRE

INFORMATION ON REQUEST

NICE TO WORK WITH

We might be talking about the Office Siren (and maybe we ought to)—but we're not. As you probably discovered long since, we have a one-track mind—and, as usual, what we're talking about is S-C Cement. Now there's something that's sheer pleasure to work with, and thousands of dentists will say "Amen". It's smo-o-o-th and easy to handle. It sets fast, but never too fast—and once it sets it stays set.

If you haven't yet had the pleasure of working with S-C Cement we'll be happy to send you a FREE SAMPLE. Just mail the coupon in your professional envelope.

S-C CEMENT

A FREE BOOKLET that gives "The Low-Down on a High Quality Dental Cement" is available. If you would like a copy of this informative publication, check the attached coupon.

OJ

STRATFORD-COOKSON COMPANY
261-63 South 3rd Street, Phila. 6, Pa.
Please send me the following, without any charge or obligation:

☐ S-C CEMENT Sample ☐ CEMENT Booklet

Dr. _____

Address _____

_____

Have you tried the

NEW BI-PO *multi-tuft?*

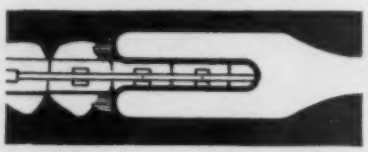
OPEN CENTER

BI-PO
ORTHODONTIC

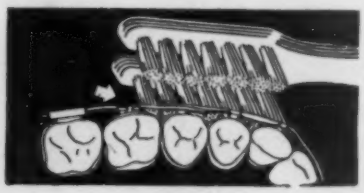
Most orthodontists agree that this improved design has remarkable efficiency in getting in and around appliances.

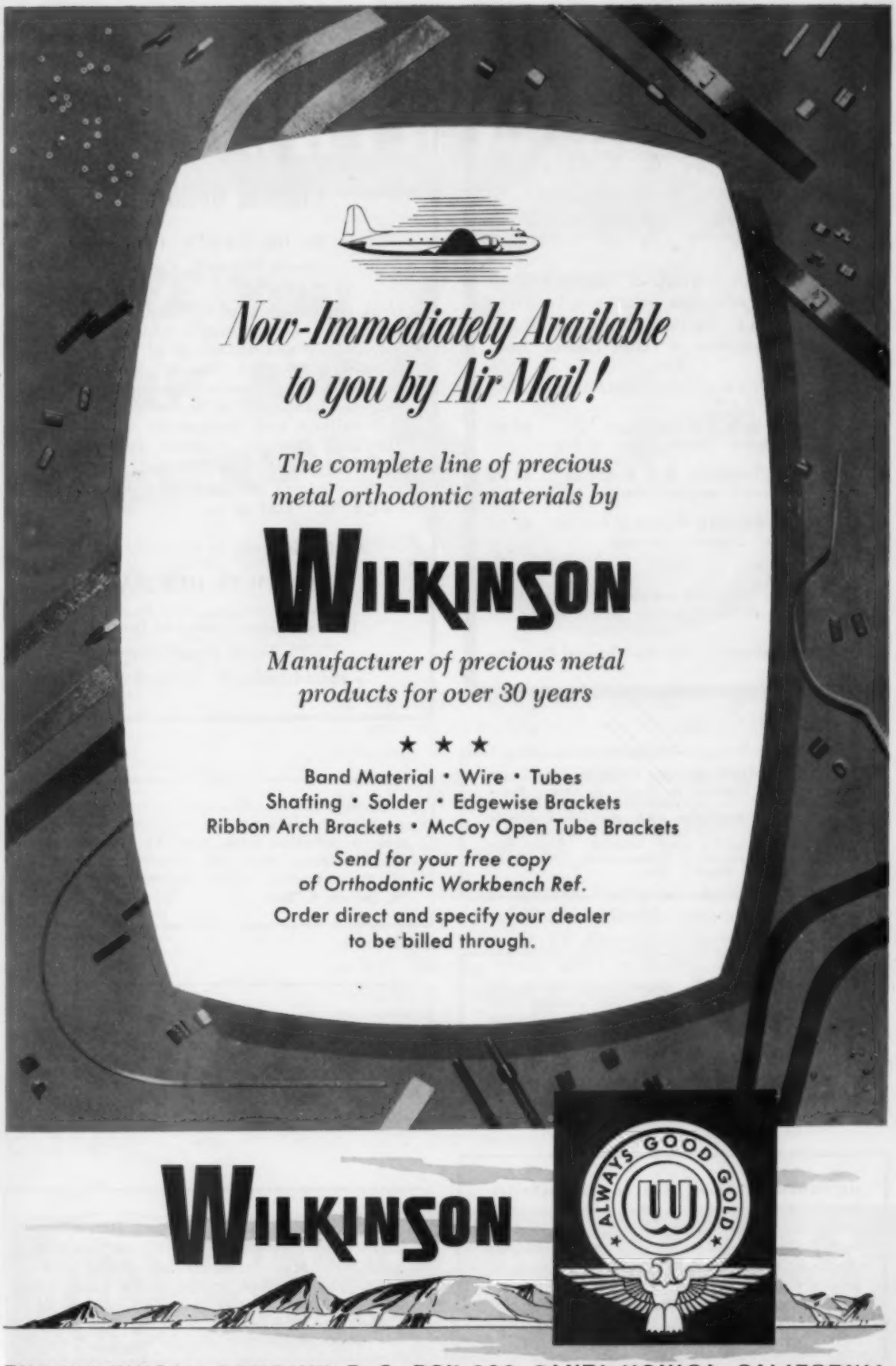
Send us your druggist's name and address and we will see that he is supplied. Free sample on request.

BI-PO Company, Box 737, Palo Alto, Calif.
Unitek Corp., 275 N. Halstead Ave., Pasadena, Calif.



Cleanses the cervical areas without interference
Gets in, around and under appliance structure





Now-Immediately Available to you by Air Mail!

The complete line of precious metal orthodontic materials by

WILKINSON

Manufacturer of precious metal products for over 30 years

★ ★ ★

Band Material • Wire • Tubes
Shafting • Solder • Edgewise Brackets
Ribbon Arch Brackets • McCoy Open Tube Brackets

Send for your free copy of Orthodontic Workbench Ref.

Order direct and specify your dealer to be billed through.

WILKINSON

ALWAYS GOOD GOLD

THE WILKINSON COMPANY, P. O. BOX 303, SANTA MONICA, CALIFORNIA

Something New... under the sun...

ORTHODONTIC SPECIALTY
LABORATORY
410 MEDICAL ARTS BUILDING
16TH & WALNUT STS., PHILADELPHIA 2, PA.

•

Under direction of a staff of properly trained **Orthodontic Technicians** offering a **Complete Ethical Service** to the busy Orthodontist and **saving the maximum of YOUR Limited Time.**

Highest Quality Workmanship at Minimum Cost

BITE PLATE with 2 S. S. Clasps . . . $4.20
Finished in Acrylic — Clear or Pink

HAWLEY RETAINERS, 2 S. S. Clasps . $5.50
Finished in Acrylic — Clear or Pink

ANATOMIC RECORD MODELS, Per Set $3.50
Beautifully Finished
PLUS POSTAGE

SEND US A TRIAL CASE and prescription and be Convinced of the Superiority of Our Service.

All Work Returned:- Air Mail Special Delivery

Temple University Announces a Course in Clinical Occlusion

By DR. LEWIS FOX
South Norwalk, Conn.

A course designed to present the fundamentals of occlusion in relation to the physiology and pathology of the periodontal supporting tissues. The entire course will be directed toward correlating the principles of occlusion to clinical criteria and therapeutic endeavors. Includes lectures, seminar conferences and clinical demonstrations.

This course will be given June 8, 9, 10, 1953. Tuition $150.00.

Applications can be made to:

DR. LOUIS HERMAN
Director of Postgraduate Studies
Temple University School of Dentistry
3223 North Broad Street
Philadelphia 40, Pennsylvania

ORTHODONTIST—Columbia University Orthodontics graduate. Licensed N. Y., N. J., Ohio. Service completed. Two interneships and private practice. Desires association with established practitioner, opportunity to purchase orthodontic practice, or will consider good location. Reply Box BD, American Journal of Orthodontics, 3207 Washington Blvd., St. Louis 3, Mo.

Orthodontist—Certificate of Training of postgraduate Orthodontic Course. Desires part-time association with New York Orthodontist. Address Box SH, American Journal of Orthodontics, 3207 Washington Blvd., St. Louis 3, Mo.

FLORIDA PRACTICE. Association available for well trained orthodontist, for rapidly growing practice in large Florida city. Subsequent ownership may be had. Reply Box BW, American Journal of Orthodontics, 3207 Washington Blvd., St. Louis 3, Mo.

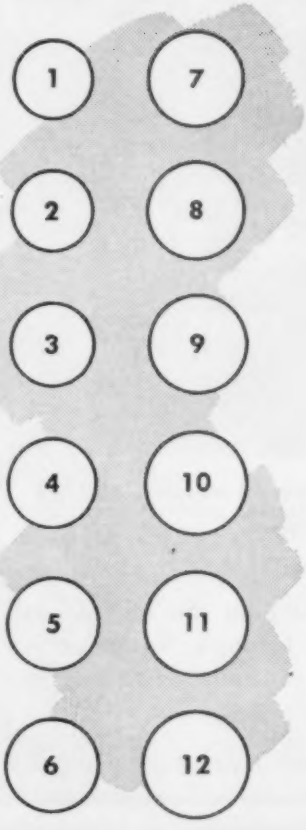
Ohio orthodontic practice available. Reason: health. Edgewise appliance; Tweed Philosophy. Excellent opportunities. Will remain to introduce patients. Agreeable financial arrangements. Address: American Journal of Orthodontics, Box WJ, 3207 Washington Blvd., St. Louis 3, Missouri.

ORTHODONTIST—Excellent Parkchester-Bronx, N. Y., location. Two- or three-room office, darkroom, laboratory, all plumbing and electrical outlets intact. Share waiting room with established Physician. Concentrated population in community Professional street. Orthodontist much in demand. Phone TA 9-7115.

In giving your patronage and encouragement to advertisers using this publication, you are not only observing sound business practice, but at the same time are supporting a worthy publication and assuring its continued growth.

DEEORTHO SEAMLESS BANDS

SAVE YOU WORK AND MATERIAL..



THESE bands eliminate cutting of band material as well as soldering and resoldering. Also there is a saving in that you have less scrap and no leftover ends of band material when you use DEEORTHO Seamless Bands. Another advantage is that a one-piece band will not open under heat of soldering tubes to the band.

DEEORTHO Seamless Bands are made of 33 B&S gauge (.007″) platinum-colored, non-oxidizing precious metal alloy in 12 diameters shown actual size at left, ranging from .360″ to .500″. They are .180″ wide, have excellent strength and a sufficiently high fusing point. Your dealer can supply you.

OTHER DEE ORTHODONTIC PRODUCTS

Dee LOCK WIRE • DEEORTHO BAND MATERIAL • DEEORTHO BUCCAL TUBES
DEEORTHO HALF-ROUND TUBES • DEEPEP WIRE

PRECIOUS METALS • DENTAL SPECIALTIES • DEE GOLD • REFINING •

HANDY & HARMAN

DEE PRODUCTS GENERAL OFFICES & PLANT
1900 WEST KINZIE STREET • CHICAGO 22, ILL.
TORONTO 2B, ONTARIO, 141 JOHN ST. • LOS ANGELES 63, CALIF., 3625 MEDFORD ST.

Easter Seals Help Crippled Children

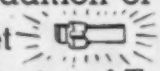
Jocko the monkey, mascot of an Easter Seal camp for crippled children, has found an appreciative audience. Your Easter Seal contributions make it possible for thousands of crippled youngsters to go to health camps.

The National Society for Crippled Children and Adults plan the 20th Annual Easter Seal campaign on behalf of crippled children throughout the nation. The 1953 appeal will open Thursday, March 5, and will continue through Easter Sunday, April 5.

Direct services to more than a quarter of a million of our handicapped population have already been extended this year as a result of funds raised during the 1952 Easter Seal Drive. These services are given at treatment and training centers in every state, the District of Columbia, Alaska, Hawaii and Puerto Rico. More than 2,000 Easter Seal affiliates provide medical treatment, convalescent care, special education, recreation, employment and placement opportunities, counseling, and other services. Your help is urgently needed to continue these important services.

MAXIMUM STRENGTH

Minimum Bulk

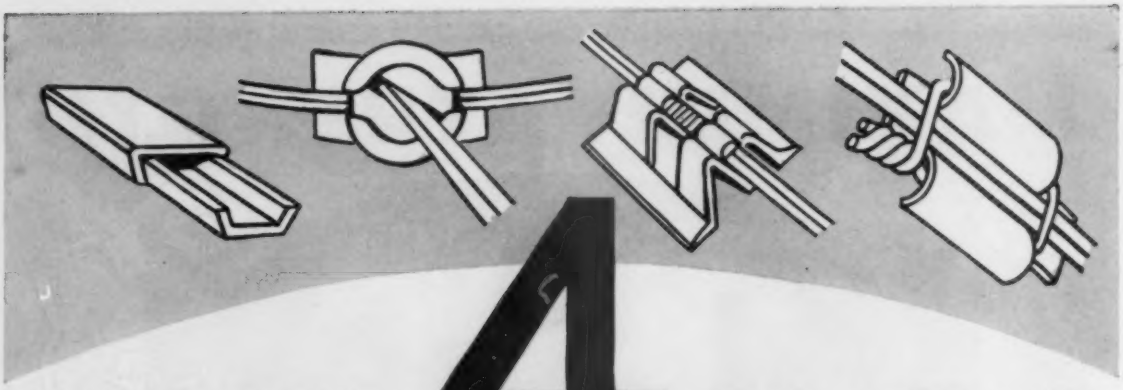
With the addition of the Edgewise Rotation Bracket  the already tremendous popularity of Tru-Chrome Edgewise appliances has been greatly enhanced. Their terrific hardness resists wear. They cannot tarnish. Note that the Anterior and Molar Brackets now have thinner flanges for still greater adaptability and still easier welding.

Anterior Brackets — Molar Brackets — Rotation Brackets — Short and Long Buccal Tubes — Dr. Holmes' Brackets and Buccal Tubes — Dr. Carey's Upper and Lower Ribbon and Twin Sliding Sections — Tie Eyelets — Rectangular Wire — ALL GENUINE TRU-CHROME!

ROCKY MOUNTAIN METAL PRODUCTS CO.

1450 Galapago Street • P. O. Box 1887 • Denver 1, Colorado

East Coast Distributors: Gilbert W. Thrombley, 220 W. 42d St., New York 18, N.Y.
West Coast Distributors: Karl A. Kreis, 443 Sutter St., San Francisco 8, Calif.
***Export Department:* P.O. Box 1051, Denver 1, Colo.**



CHANNEL AND CAP • 4 LOCK • SNAP • TIE

Famous Bracket types

are available for TRU-CHROME

DIRECT

TWIN-ARCH TECHNICS

Spotwelding Tru-Chrome materials (unvarying in uniformity) produces a lighter, stronger, non-corrosive, tissue-tolerant, precision Twin-Arch appliance in *one chair time. Maximum strength with minimum bulk*—that's Tru-Chrome!

"Direct Twin-Arch Technique" Booklet on Request

In Tru-Chrome: Tubular End Sections—Round Buccal Tubes—2 Types of Twin-Tie Channel Brackets—Twin Snap Channel Brackets—Lock Pins—Ford Locks—Channel and Cap Brackets.

TRU-CHROME

ROCKY MOUNTAIN METAL PRODUCTS CO.

1450 Galapago Street • P. O. Box 1887 • Denver 1, Colorado

East Coast Distributor: Gilbert W. Thrombley, 220 W. 42d St., New York 18, N.Y.
West Coast Distributor: Karl A. Kreis, 443 Sutter St., San Francisco 8, Calif.
***Export Department:* P.O. Box 1051, Denver 1, Colo.**

TRU-CHROME FOR DELICACY AND STRENGTH

American Journal
of
ORTHODONTICS
(All rights reserved)

VOL. 39 MARCH, 1953 No. 3

Original Articles

A NEW APPROACH TO THE ANALYSIS AND TREATMENT IN MIXED DENTITION

SILAS J. KLOEHN, D.D.S., APPLETON, WIS.

THE time to start orthodontic treatment is a basic problem in which there should be considerable harmonious agreement and understanding, but unfortunately there seems to be considerable confusion among various groups within the profession. Some are of the opinion that appliances should be placed as soon as any of the permanent teeth erupt in an abnormal position, while others are of the opposite opinion, advocating no treatment until all the permanent teeth have erupted. Between these of the extreme opinions of always and never, there is a small group realizing the importance of the balance of environmental forces to a good stable occlusion, who are taking the middle road. They are applying the principles of growth and development and starting treatment at various ages whenever a definite plan of treatment can be determined whereby the best stable results can be obtained.

In the history of medicine and dentistry we find a great tendency of trends in treatment which have frequently impeded the progress of the science. Orthodontics has had its malicious trends and will have more unless we as clinical orthodontists make some efforts toward correcting this condition. We must keep well informed in the fundamental work of our sciences, namely, anatomy, physiology, and histology, so we can better correlate our clinical treatment with the growth and development of the jaw and denture and maintain a biological concept of tooth movement. Any conclusions and hypotheses that are presented as the long-waited-for Utopian answers to our failures and relapses should be viewed with suspicion and carefully studied. Every case of malocclusion has its own individual problems and must be considered as such. If we will carefully analyze each case and just as carefully plan our treatment, we will have less failures.

This thesis was presented as part of the requirement for certification by the American Board of Orthodontics. It was selected to be presented before the American Association of Orthodontists at the next meeting of the Association and recommended for publication.

Much valuable information can be obtained in studying the history of any science, and the history of when orthodontic treatment should be instituted is no exception.

The literature of the first twenty-five years of the twentieth century contained many articles of the advantage of early treatment. For example, D. Willard Flint presented at the Seventh Annual meeting of the American Society of Orthodontia on Oct. 2, 1907, a paper entitled, "Early Treatment in the Correction of Malocclusion of Teeth." I should like to quote a few important points from this paper: "Prevention is always better than cure." "Deformity can be averted by doing things at the right time." "Let us guide the teeth as they erupt into their proper places and the deposition of bone around the roots of the teeth will be as nature first intended." "Objections. If the patient had to have appliances in the mouth continuously there certainly would be an objection because of the great care that must be given those mouths to avoid involving early decay."

The principles of the presentations of most of these early writers are very similar and many are still acceptable to our present-day thinking. They had reached some conclusions and hypotheses without scientific evidence, which was partly responsible for the change away from early treatment. The most significant was the conclusion that early treatment influenced the amount and direction of the growth of facial bones, particularly the mandible. This erroneous concept was reached from the changes of facial esthetics through observation and study of facial bone through soft tissue of treated patients.

Facial growth and development during this time were studied on dry skulls and on the living of hard tissue landmarks, through the soft tissue covering, neither of which was accurate. Dried skulls permitted only comparison of different individuals of successive ages and usually defective ones or they would still be living. Measurements of hard tissue landmarks through soft tissue certainly did not permit accurate scientific conclusion.

In about 1930 Dr. Broadbent gave to the profession the cephalometer which permitted accurate scientific methods of study of the growth and development of the face on living individuals. He gave us the growth and development of the face and the eruption pattern of the teeth in the normal child. During this time, Dr. Brodie was carrying on a cephalometric study of the facial pattern and concluded the pattern was quite stable and did not change throughout its growth. Cephalometric studies before, during, and after treatment indicated that treatment had no influence on the growth of facial bones.

These cephalometric findings indicated that orthodontic appliances did not always obtain the results that were observed clinically. For example, in treatment of Class II, Division 1 malocclusion, the mandible did not change its growth pattern nor did the growth increase beyond what occurred in the untreated. It was further observed that the maxillary teeth did not move distally as much as was concluded from clinical observation, but, rather, the mandibular teeth moved forward in relationship to the maxillary teeth as well as to the body of the mandible.

The cephalometer was one of the most important contributions of our profession, being the first positive scientific method of observing growth and development on any individual throughout his life span. It was the opinion of many that we could now solve all our orthodontic problems in a scientific method. However, the findings that the facial pattern did not change throughout its growth period, and the failure of orthodontic forces to influence or change this pattern or growth rate was most discouraging to the clinical orthodontist. It contradicted many of our beautiful hypotheses and conclusions reached from the successful clinical results and facial changes produced by orthodontic appliances. The scientific researcher fully realized this contradiction but refrained from expressing any opinions in regard to changes in treatment. He realized the importance of obtaining more fundamental knowledge before making such vital changes and conclusions.

A great many impatient clinical orthodontists took these findings and immediately reached conclusions such as: "If we cannot influence growth and development nor change the pattern, mixed dentition treatment is useless." We find these statements in the literature, but particularly can we notice its effect in the absence of work and writings on treatment in mixed dentition. Since 1930 very little has been published on the advantages of early treatment, even case reports of mixed dentition cases were conspicuously absent. All the work and conclusions on environmental forces of occlusion and their effect on the developing face seem to have been ignored. Orthodontics entered another trend, forgetting many of our previous fundamentals, and became very mechanical.

Those who encouraged and led this trend quoted the cephalometric findings as their conclusions, but it is my belief most of them were directed by the failure in early treatment. This conclusion is reached by the continuation of early treatment by practically all orthodontists on mild Class III and pseudo Class III malocclusions. In these cases we did not change the growth nor the pattern of the facial bones any more than in any other type of malocclusion. The orthodontic appliances merely corrected tooth relationship, thereby producing better growth and development of environmental forces and changes in pattern and growth of alveolar bone.

The upper models in Fig. 1 are right and left views of a Class I malocclusion often termed pseudo Class III with an underdevelopment of the maxillary arch in a boy 8 years of age. The maxillary incisors, all the maxillary deciduous molars and canines, and the right 6-year molar are lingual to their mandibular antagonists. The lower models were taken after five months of treatment, using the edgewise arch appliance in upper and lower arches. The teeth are in correct functioning relationship for his age.

During treatment the maxillary arch length from the buccal groove of the 6-year molar to midline was increased from 41.5 mm. to 46 mm. The width of the molars was increased from 46 mm. to 49 mm.

Fig. 2 is an occlusal view, right, before, left, after. You can readily see the increase in size of the maxillary arch. The mandibular arch has good form and balance, and every attempt was made to maintain this and cause as little disturbance as possible in tooth position as well as alveolar bone.

Fig. 3 shows photographs of the patient, upper, before, lower, after. Analysis of the models, photographs, and clinical evidence will conform to scientific cephalometric findings that treatment did not change the pattern nor stimulate growth of the facial bones. The changes resulting from treatment were confined to alveolar bone.

The teeth were placed in normal functioning relationship, permitting better alveolar bone growth, better balance of the environmental forces, and a more stable result. Treatment time as compared to treatment after eruption of all the permanent teeth was reduced about 60 per cent. Bands were placed on only twelve permanent teeth, thereby keeping tissue destruction and disturbance at a minimum. Psychologically, this patient was given help at the most critical time. For retention, a palatal plate was worn about five months and the case was developing very nicely. I am certain this patient will need no further treatment.

Let us analyze what perhaps would have occurred if treatment had been postponed until all the permanent teeth had erupted. The maxillary arch would have remained locked within the mandibular arch, disturbing its normal growth and development. The right and left maxillary canines perhaps would have erupted into a labial position and protruded into the lip. The environmental forces, the tongue, and the facial musculature could not have reached their well-developed form, position, and tonicity. The alveolar bone of the maxillae would not have received the normal stimulating forces of occlusion, which would have retarded its growth and development. At 12 years of age there would have been a severe malocclusion requiring about twelve to sixteen months of treatment and many months of retention. The environmental forces, which normally keep the teeth in a dynamic balance, would have had their growth and development disturbed to such an extent that they would not have reached that nice balance necessary for a good stable result.

Treatment in the mixed dentition in these cases proved successful so they have continued without consideration of cephalometric findings of growth. The treatment did not influence the growth nor pattern of the facial bones, but why should we be too much concerned if we produce a normal occlusion that is stable with a well-balanced face.

Treatment in Class II and Class I malocclusions was condemned and discontinued by many orthodontists because we could not influence the growth of the facial bone nor the pattern. This does not seem logical when we consider the success of treatment in mild Class III and the pseudo Class III.

In attempting to analyze the reasons for the failures of some of our mixed dentition treatment, we recognize one of the greatest handicaps of orthodontics, namely, definite rules for treatment. The orthodontic profession has always had a great tendency toward giving rules for treatment according to classifications of malocclusion and many men are following these rules blindly. It is a well-established fact that standardization of treatment in various types of malocclusions with rules to cover the same does not seem possible in orthodontics. We can and must have principles relating to treatment and time of

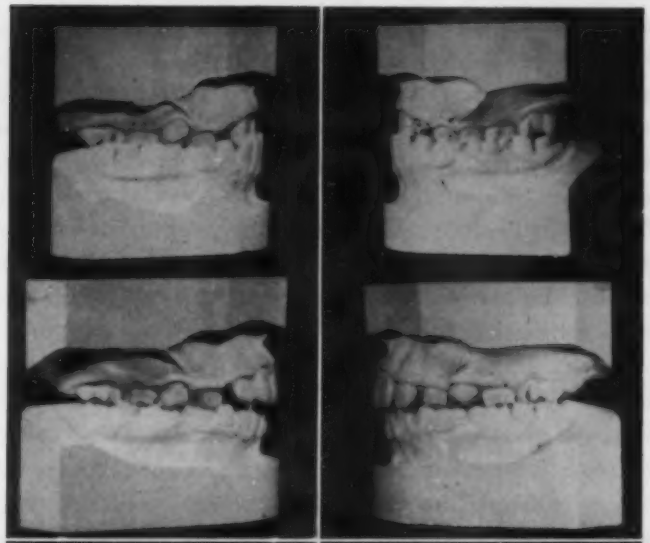


Fig. 1.

Fig. 2.

Fig. 3.

treatment which can be readily applied to each individual case, but not rules. The exact sciences use and apply rules with success, but orthodontics is an applied science with too many variables.

In our allied profession, orthopedics, early treatment of deformities and abnormalities is essential to develop better musculature, train muscles for better function, and thereby direct function and growth. There may be some who would question this correlation because the deformities of malocclusion are quite different from deformities of other parts of the body. But we need to study only the fundamental principles of these abnormalities and find many correlations with aims toward a similar goal. A good stable orthodontic result requires a balance of the forces of occlusion which means good tongue position and function, good facial musculature, and a harmonious functional relationship of the teeth. When treatment is completed and mechanical retention removed, the denture must be held in a dynamic balance of these forces.

The principles determining time of treatment should be uniform in orthodontics as well as orthopedics, and will serve as a guide in which we can hope to find agreement. The principles I applied to each case to determine the time of treatment are as follows in their chronological order of importance:

1. When can the most stable result be obtained? This is dependent on the detrimental effects of the malocclusion, on the development of the environmental forces of occlusion, on the path of eruption of the remaining unerupted teeth, and on the growth of the alveolar bone.
2. When is it possible to correct the malocclusion with the least amount of disturbance and destruction of tooth tissue and alveolar bone?
3. When is it possible to have the shortest time of treatment?
4. When is it possible to use the least amount of appliances?
5. What is the psychological effect of the malocclusion on the patient?

The application of these principles to each individual case will necessitate a plan of treatment which will permit fulfillment of these requirements. All previous mixed dentition analysis and plan of treatment was very similar to that used in adult treatment, which perhaps is responsible for some of our failures.

In the analysis of Class II malocclusion prior to 1930 the etiology usually was an underdevelopment of the mandible. The treatment plan was to place appliances in the maxillary and mandibular arch using intermaxillary elastics, thereby stimulating mandibular growth. Cephalometric findings clearly indicated that we did not increase mandibular growth beyond its regular intended growth rate nor could the pattern be changed. Analysis of treated cases indicated that in most cases the mandibular teeth moved mesially en masse, placing them in a protrusive position.

An attempt was then made to reinforce the anchorage of the mandibular teeth by changing the axial inclination, but the mandibular teeth still moved mesially. Growing alveolar bone is in a continuous state of flux, and teeth in this type of bone will not provide much anchorage. The changing of axial inclination failed to reinforce the anchorage as intended, and the results were

the same, namely, the so-called double protrusion dentures. This resulted in collapses and failures which were most difficult to treat in the second period of treatment after the remaining permanent teeth had erupted. The conclusions reached from these failures are the hypothesis used in advocating early extraction of bicuspids. This has been carried to such an extent today that we find a few men advocating removal of first bicuspids before they have erupted.

The continued research findings changed our concept of the abnormality of Class II malocclusion. The cephalometric studies indicate that the mandible in Class II malocclusion did not always differ as much from those observed in Class I as was thought at one time. This would rule out mandibular underdevelopment as a constant etiological factor in Class II malocclusion. We can consider these findings favorable knowing that at the present time we cannot influence the growth of the mandible by orthodontic appliances.

The growth studies of the face and cranium did not reveal any information that would permit us to form any definite conclusions on etiology of the various malocclusions except perhaps an environmental factor found active in a few specific cases. As Brodie so well stated: "Malocclusion with the exception of those traceable to local environmental causes becomes the visible symptom of inharmonious relationship between parts closely adjacent to or quite remote from the mouth proper. And such disharmony apparently can be traced only to the change operation of genetic laws."

In other words, a Class II malocclusion may have a well-developed mandible, but has a discrepancy in the pattern or relationship of other facial bones or the cranium to which it is attached or both. As stated at various times, these discrepancies in pattern and relationship of facial bones cannot be changed by appliances. This might be discouraging if it were not for the past clinical evidence of marked facial improvements and beautiful occlusions produced by good orthodontic treatment in many cases.

Fortunately the alveolar bone is very responsive to changes, produced by changes in position and relationship of the teeth. This is followed by secondary changes in facial outline and contour with apparent changes in the environmental forces of the denture, namely, the facial musculature.

There is very little known or written about the pattern or growth of the alveolar process. Observation has led us to conclude that it grows most rapidly during the time of eruption of the teeth, which would be from birth to about 14 years of age. It is only logical that the response of this bone is greater during the most active growth period. Therefore, we can conclude that treatment during this time is more successful with much less disturbance of this tissue.

If we accept the conclusions that alveolar bone will respond more rapidly during its most active growth period, it will be necessary to change our plan of treatment in mixed dentition. Our plan of treatment and our appliance therapy must be directed on those teeth which are in an abnormal position, without disturbing those that are in a correct position and balance. Many Class II, Division 1 malocclusions are typical examples. There is good man-

dibular arch form with the teeth in good relationship to each other, with good relationship to the supporting alveolar bone and the mandible, which indicates they are in balance with the lips and tongue. The abnormality is a mesial relationship of all the maxillary teeth with a severe protrusion of the incisors, which places the teeth in an abnormal functioning relationship and produces a severe facial deformity.

In treatment, these maxillary teeth must be moved distally without disturbing the position and balance of the mandibular teeth. In a growing denture, this change can be accomplished with a very simple appliance because we are not moving teeth so much, but rather guiding them into a correct position, thereby changing the pattern and direction of growth of the alveolar bone. In many cases unlocking occlusion and permitting the alveolar bone its maximum potential growth will correct mild abnormalities.

The following cases will demonstrate the analysis, plan of treatment, and appliances used by me in mixed dentition treatment.

In Fig. 4 the upper models are right and left views of a patient about 10 years of age. Fig. 5 shows occlusal views, right models, before, left, eight months after all appliances were removed. The mandibular arch form was good before treatment and no appliances were placed. It developed very nicely and was in good balance with environmental forces. Fig. 6 shows photographs of the patient, upper, before, lower, after.

The conclusion reached after analysis of this malocclusion was that this patient had good mandibular development but a discrepancy in growth, somewhere in the maxillae or the cranium, or both. As stated before, this malocclusion and facial deformity existed at 3 years of age and was showing signs of developing a more severe facial deformity. The mandibular arch form, as stated before, was good with a slight crowding in the lateral canine area showing a slight lack of growth in width of the arch and alveolar bone. The mandibular teeth were in good relationship to the mandibular base, and in good balance to the environmental forces. With this information the conclusion was reached that mandibular tooth alignment and arch form would develop satisfactorily during the transitional period, providing they were not disturbed in their present balance and given a better opportunity by restoring better function.

The plan of treatment was to move all the maxillary teeth distally and decrease arch length. Bands were placed on the maxillary right and left molars with tubes attached on the buccal to receive a labial arch. An arch was made of .045 inch steel to which hooks of .055 inch were soldered; it was worn at night with elastics to a headcap. This case responded unusually fast and was developing very nicely. There was a good opportunity that she would need no further treatment. Since the bite plane was placed, the mandibular arch was developing very nicely. There were no cephalometric analyses made, so I relied upon observation as to what actually occurred. It is my belief that the maxillary teeth were moved distally while the mandible and the rest of the facial bones continued their forward growth. We had very good growth which is necessary in all cases to obtain the best results.

Fig. 4.

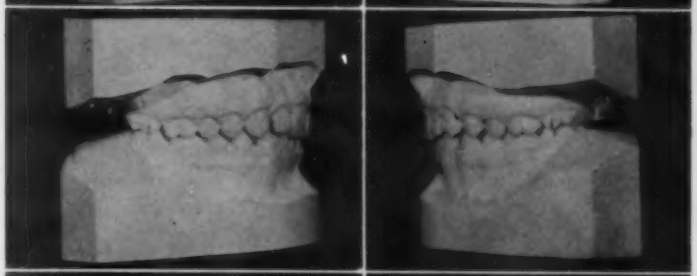


Fig. 5.

Fig. 6.

Fig. 7 shows the headcap and arch in place. There are many types of headcaps and methods of occipital anchorage. With children of this age and this type of treatment, there are two factors that must be considered in the use of occipital anchorage:

1. The headcap must be comfortable if you expect the patient to wear it seven nights a week, which is necessary.

Fig. 7.

Fig. 8.

Fig. 9.

2. The direction of pull on the arch is very important. The principle of this treatment is to move the molars distally and the pull of the transseptal fibers of the periodontal membrane will move the buccal deciduous teeth in the same direction. If the molar is tipped distally too severely, contact with the deciduous molar will be lost and the effects of the transseptal fiber pull will be lost. With a long lever action such as we have here from the molar to the midline, tipping occurs very easily and can be controlled only by the direction of the pull of the hooks attached to the arch.

Fig. 8 shows side and front views of the new anchorage band. Fig. 9 is a side view of the arch in place, right showing angle of the face bow or hook in relationship to the face and arch if distal tipping of the molar is desired, left, if distal tipping of the roots is desired.

Fig. 10.

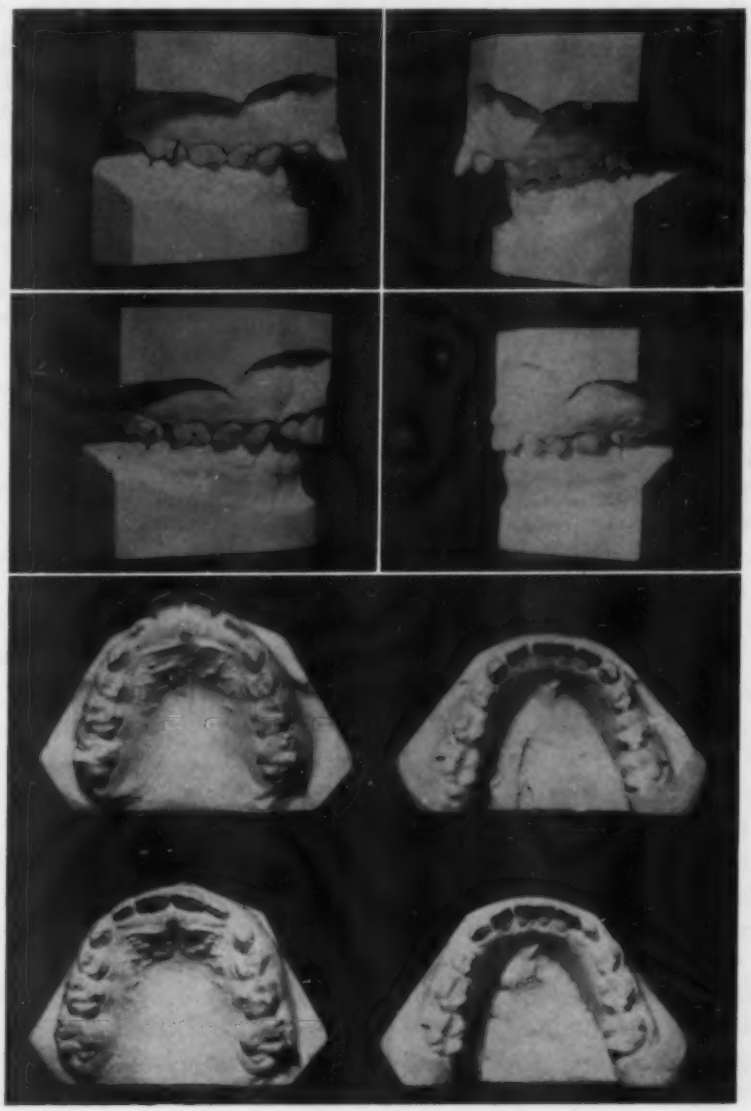


Fig. 11.

This treatment in Class II, Division 1 malocclusion has proved very successful. The teeth are placed in normal functioning relationship, thereby permitting good growth of the alveolar process. As you noticed in the photograph, the lips are in good balance permitting normal breathing and better development of the environmental forces of occlusion. The patient had the

minimum amount of appliance with the minimum amount of tissue disturbance. At no time does the patient suffer any pain or uncomfortableness. Psychologically we have accomplished considerable for the patient in obtaining this result early in life.

Some of these patients will need a second period of treatment if some of the unerupted permanent teeth assume an abnormal position upon eruption. However, the main objectives have been obtained: better development of facial musculature, better balance of the environmental forces of occlusion, better development of the alveolar bone resulting in a better stable result. If a second period of treatment is necessary, it will be much shorter; and the absence of pain and irritation in the first period of treatment leaves the patient psychologically more cooperative.

Upper models in Fig. 10 show another typical Class II, Division 1 malocclusion of a patient 8 years of age. She had four permanent first molars, the four upper and lower permanent incisors. Bands were placed on the first molars with headcap and arch worn only at night. Lower models were taken fourteen months later.

Upper models in Fig. 11 are occlusal views before treatment, lower, fourteen months later. Arch length in the maxillary arch from the buccal groove of the molar to midline was decreased about 3 mm.

The mandibular arch form was good before treatment and remained the same because no appliances were placed on these teeth. In the lower mandibular model you will note that the canines are erupting in good position.

Fig. 12 shows photographs of the patient before treatment. The protrusion of the maxillary teeth made it impossible for this girl to close her lips normally, as a result of which she had developed a mouth breathing habit. In studying the relationship of the mandibular teeth to their base as well as the development of the mandible, one reaches the conclusion that this is a case in which failure is certain to follow if the mandibular teeth are moved labially even the minimum amount.

Fig. 13 shows photographs of the same patient after fourteen months of night treatment. The lips have not developed as nicely as would be desired, but this is facial type. Perhaps some would say mandibular growth has not been as good as would be desired; however, this is merely a guess. It could be facial type, but whatever it is orthodontic treatment cannot change this and the patient still has considerable time for growth. Good lip exercise and good growth may result in a better facial balance.

The upper models in Fig. 14 are right and left views of a Class II, Division 2 malocclusion in a boy 9 years of age. The lower models are right and left views taken eighteen months later. The only appliances used consisted of bands on the maxillary right and left molars with a round arch and headcap worn only at night. During the daytime, a palatal bite plane was worn to correct the deep overbite and to unlock occlusion, thereby permitting better function. The relationship of maxillary to mandibular dental arch has been changed from Class II to a Class I without placing any appliance on the mandibular teeth.

Fig. 15 shows occlusal views, right models before and left models eighteen months later. The mandibular teeth were in good alignment before with a fair arch form. There was an excessive curve of Spee with a flattening in the incisor area, which was the result of the influence of the upper incisors by a deep overbite. The maxillary incisors did not permit normal alveolar bone growth in the mandibular incisor area. The bone covering the labial surface of these roots was very thin with a slight inflammation of the gingival tissue. This is the type of case in which recession of the alveolar bone and gum tissue frequently occurs when bands are placed on these teeth. The mandibular teeth must not be moved labially with appliances if we expect a stable result with good healthy tissue.

Fig. 12.

Fig. 13.

The left models show the correction and improvement in mandibular arch resulting from wearing the bite plane which merely corrected occlusal interference, thereby permitting better alveolar bone growth in this area.

The maxillary arch before treatment, which is the upper right model, is much too short to permit normal eruption of all the teeth. The lateral incisors are crowded labially with a lack of space for the canines. In analyzing the models separately, there is a great similarity to the maxillary model of pseudo Class III shown in Fig. 2. Treatment to obtain arch length, however, is entirely different. The premaxillary area is well developed with the apical ends of the incisors too far labially in comparison with the remaining maxillary and mandibular teeth. The maxillary buccal segments must be moved distally

without any mesial movement of the maxillary incisors or any of the mandibular teeth. The arch length of the maxillary arch from the buccal groove of the first molar to the midline before treatment was 41.5 mm. After eighteen months of headcap treatment, arch length was increased to 45 mm., which is sufficient space for the bicuspids and canines which are erupting. During this time there was no mechanical force or pressure on the incisors. As the maxillary molars were moved distally, their width was increased from 54 to 59 mm. This is necessary to maintain good relationship with the mandibular molars because the width of the dental arches increases as we move distally.

This case will need further treatment, but the major objectives were obtained. The molars were in Class I relationship, arch length was increased to accommodate all the permanent teeth, the overbite was partially corrected, permitting good functional relationship of the maxillary and mandibular teeth. This was all obtained without placing any appliance on the mandibular teeth, resulting in a minimum amount of tissue disturbance.

Fig. 16 shows photographs of the patient, upper, before, lower, eighteen months later. The facial balance was good before treatment was started and has been maintained with some improvement.

Upper models in Fig. 17 are right and left views of a 9-year-old boy with a Class II, Division 1 malocclusion. Lower models are right and left views after two years of treatment. Bands were placed on the maxillary right and left molars with a round arch and headcap worn at night. A Hawley bite plane was worn in the daytime for about one year.

Fig. 18 shows occlusal views, right models, before, left models, two years later. The mandibular arch was fair. There was an early loss of the right and left deciduous molars with some loss of space. The distal movement of the maxillary 6-year molars with the headcap and the use of the bite plane seemed to have stopped the mesial drift of the mandibular molars, permitting normal eruption of the permanent canines and bicuspids without any mechanical assistance. Maxillary arch length was decreased 2 mm. while molar width was increased 1 mm.

Fig. 19 shows photographs of the patient, upper before treatment, lower, two years later.

The upper models in Fig. 20 are right and left views of a patient about 9 years of age with a Class II facial malformation and a severe protrusion of the maxillary teeth. The molar relationship is Class I due to mesial tipping and drifting of the mandibular molars. This is the result of early loss of deciduous molars.

Lower models are right and left views of the same patient after fifteen months of treatment. Appliances used were bands on maxillary molars with a headcap. In the mandibular arch, bands were placed on first molars with a lingual arch correcting mesial inclination of the molars and attempting distal movement of these teeth.

Fig. 21 shows occlusal views, right models, before, left, fifteen months later. Maxillary arch length was decreased 1 mm. Mandibular arch length on the right side was increased 7 mm.; on the left, arch length was increased

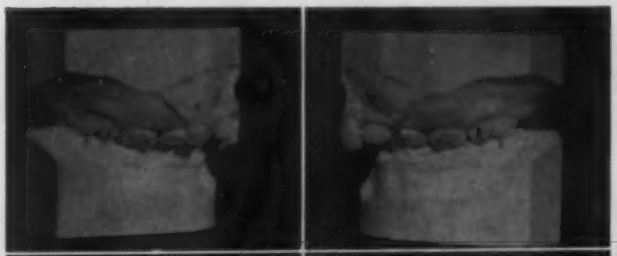


Fig. 14.

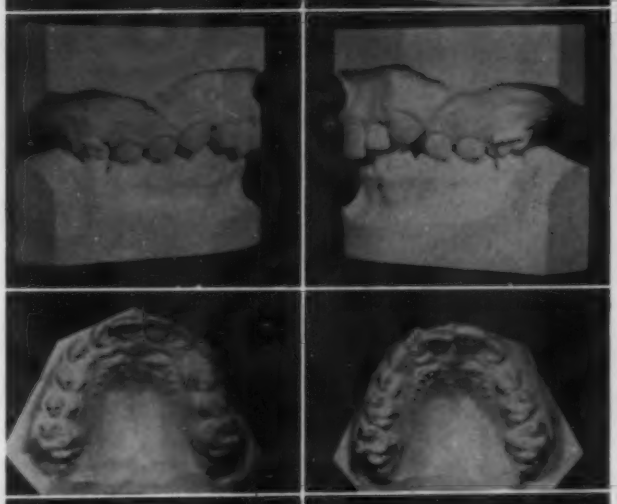


Fig. 15.

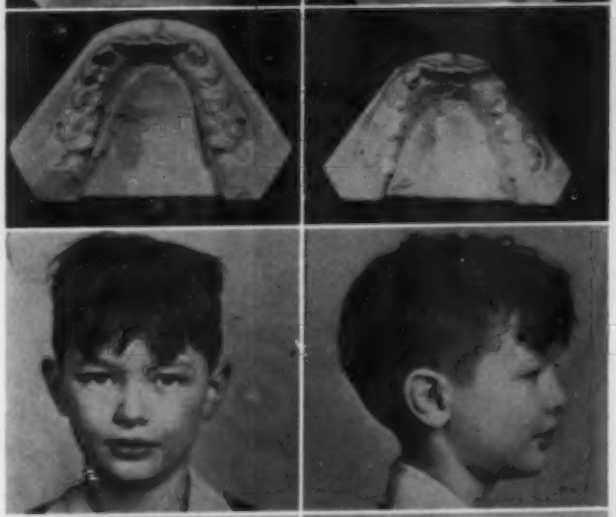


Fig. 16.

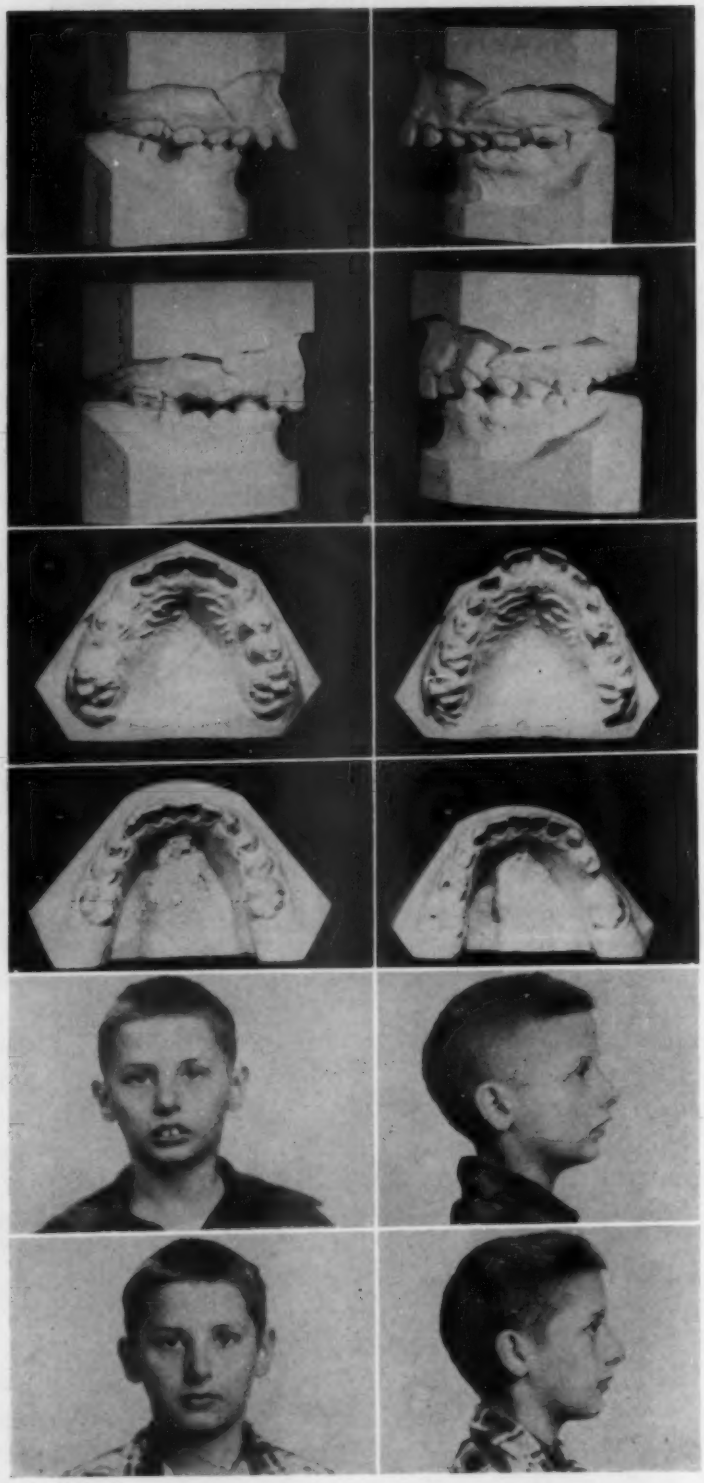


Fig. 17.

Fig. 18.

Fig. 19.

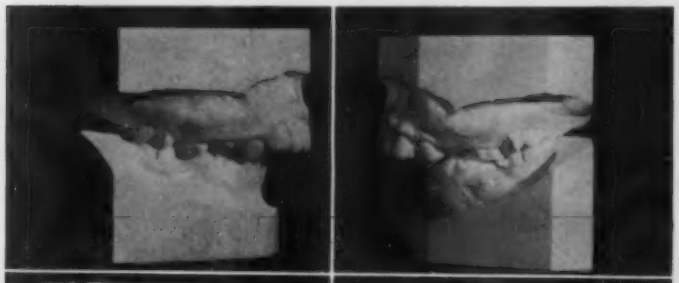


Fig. 20.

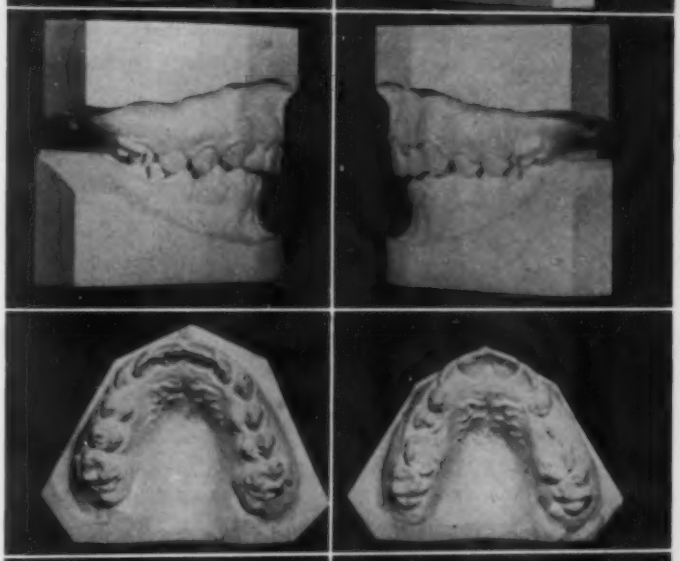


Fig. 21.

Fig. 22.

4 mm. All the permanent teeth erupted with fair arch form and good intercuspal relationship. There were a few details such as slight rotations and axial inclinations to be corrected. Fig. 22 shows photographs of the patient, upper, before, lower, fifteen months later.

The upper models in Fig. 23 are right and left views of a patient about 9 years old with a full Class II malocclusion. It is neither a Division 1 nor a Division 2. The molars were in full Class II relationship with all the maxillary teeth mesial to their antagonists, with a rotation and mesial positioning of the central incisors. The appliances used were bands on the molars with a headcap. There was no deep overbite, and the cuspal relationship of maxillary and mandibular teeth did not seem to be locked so no bite plane was necessary.

The treatment plan was to move the maxillary buccal teeth, canines, and lateral incisors distally, thereby increasing arch length and providing sufficient space to permit the central incisors to rotate and assume a correct position in the dental arch. The lower models are right and left views taken ten months later, with a Class I relationship.

Fig. 24 shows occlusal views, right models, before, left, ten months later. The mandibular arch form and tooth alignment were good before treatment, and no appliances were placed. Arch length of the maxillary arch was increased 3 mm. Notice the change in position as well as rotation of the maxillary central incisors and the nice arch form of the maxillary arch.

To increase arch length, it was necessary that the mechanical arch during treatment was kept about 3 to 4 mm. away from the central incisors. The change in arch form and rotation of the central incisors is the direct result of the effects of transseptal fibers and function. The central incisors were not completely rotated but there was sufficient space obtained by increasing arch length, and the final work on these teeth was completed by a Hawley retainer. Two months before this article was written the retainer was removed after the patient had worn it four months; she had perfect occlusion and alignment of her teeth.

Fig. 25 shows photographs of the patient, upper, before, lower, after. The facial balance was fair before treatment, and it improved.

Someone may say this patient had good growth and could have been treated with several usual methods. In my analysis, there are several very important advantages of this type of treatment. First, the mandibular teeth are in good alignment, good arch form, good relationship to the supporting bone, and in good balance to their environmental forces. Any changes in the position or relationship of these teeth may place them in a less stable position, thereby inviting relapse. Experience has taught us that this relapse usually occurs in the incisor segment and the patient returns with the usual comment—The upper teeth are in nice alignment, but look what is now happening to this lower tooth.

The second advantage of this treatment is the simplicity of appliances and the minimum amount of time. We made only two bands and an arch and headcap. During the ten months' treatment the patient was in my office eight times and no appointment was longer than ten minutes. The only appliance

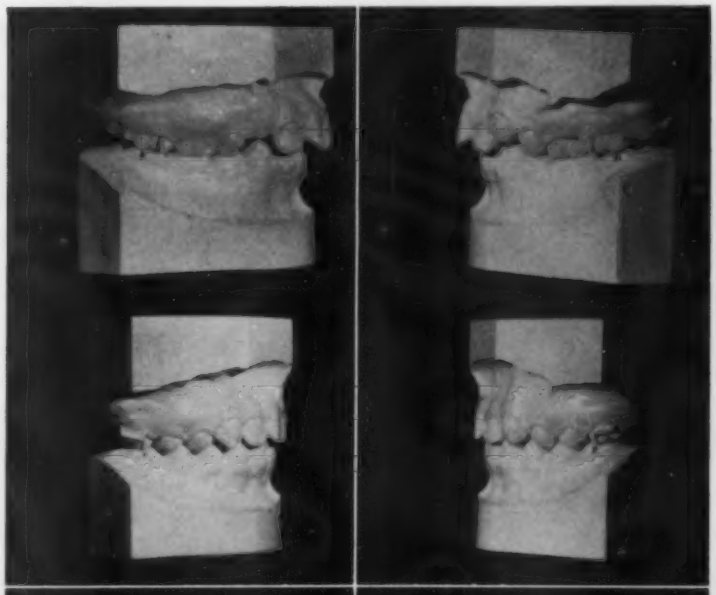


Fig. 23.

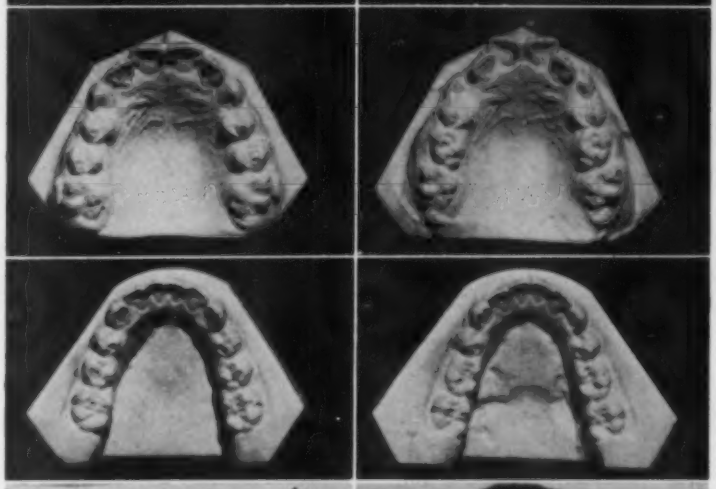


Fig. 24.

Fig. 25.

adjustment was to keep the arch advanced so the molars could move distally without having the arch affect the incisors. The appliance must be checked because the patient places it every night and removes it in the morning, leaving possibility of slight changes when handled carelessly. This patient was very cooperative, not even having a loose band any time during treatment.

Another important advantage was no pain or irritation throughout the entire treatment time. This, together with the psychological effect of no appliances during the daytime, is a much greater advantage than most of us realize.

The classification of malocclusion by Angle was one of the most significant contributions to our science, bringing order out of chaos, and is still very valuable. This classification was made on teeth in occlusion and has been enlarged and clarified by the scientific findings made possible through cephalometric studies. The work of Thompson and Brodie on the rest position of the mandible clearly indicated the necessity for an analysis of the mandible to maxillae and cranium from a dynamic functional consideration to interpret the malocclusion better. Frequently abnormal eruption and position of the teeth will force the mandible upon closure into an abnormal position. This is very misleading when analysis is made with the teeth in occlusion. The plan of treatment must be changed, and especially is this necessary when treatment is started in mixed dentition.

Upper models in Fig. 26 are right and left views of a 10-year-old girl with a typical Class II, Division 2 malocclusion when the teeth are in occlusion. The analysis of the normal mandibular rest position revealed that she did not have a Class II relationship of the mandible to maxillae, but rather a Class I. The maxillary central incisors were tipped lingually and upon bringing the teeth in occlusion, the mandible was forced into a distal position.

A palatal bite plane was placed with finger springs to move the maxillary central incisors mesially, and labial finger springs to tip the lateral incisors lingually. The bite plane must be flat so it will not influence the position of the mandible.

The lower models are right and left views of the same case eight months later with no other appliances.

Upper models in Fig. 27 are occlusal views before, lower models, after. The mandibular arch was good before and remained the same because no appliances were placed. It is my belief that unlocking occlusion permitted better development of the mandibular alveolar bone. The curve of Spee was corrected by the bite plane because it permitted further eruption of the molars, and partially corrected the deep overbite.

The axial inclination of the maxillary incisors is abnormal and was changed by placing edgewise appliances on the maxillary teeth. These appliances were worn five months. It is my belief that this was an error in my treatment. If I had just tipped the central incisors labially and permitted the lip force to mold the lateral incisors, the bite plane would have given a satisfactory result.

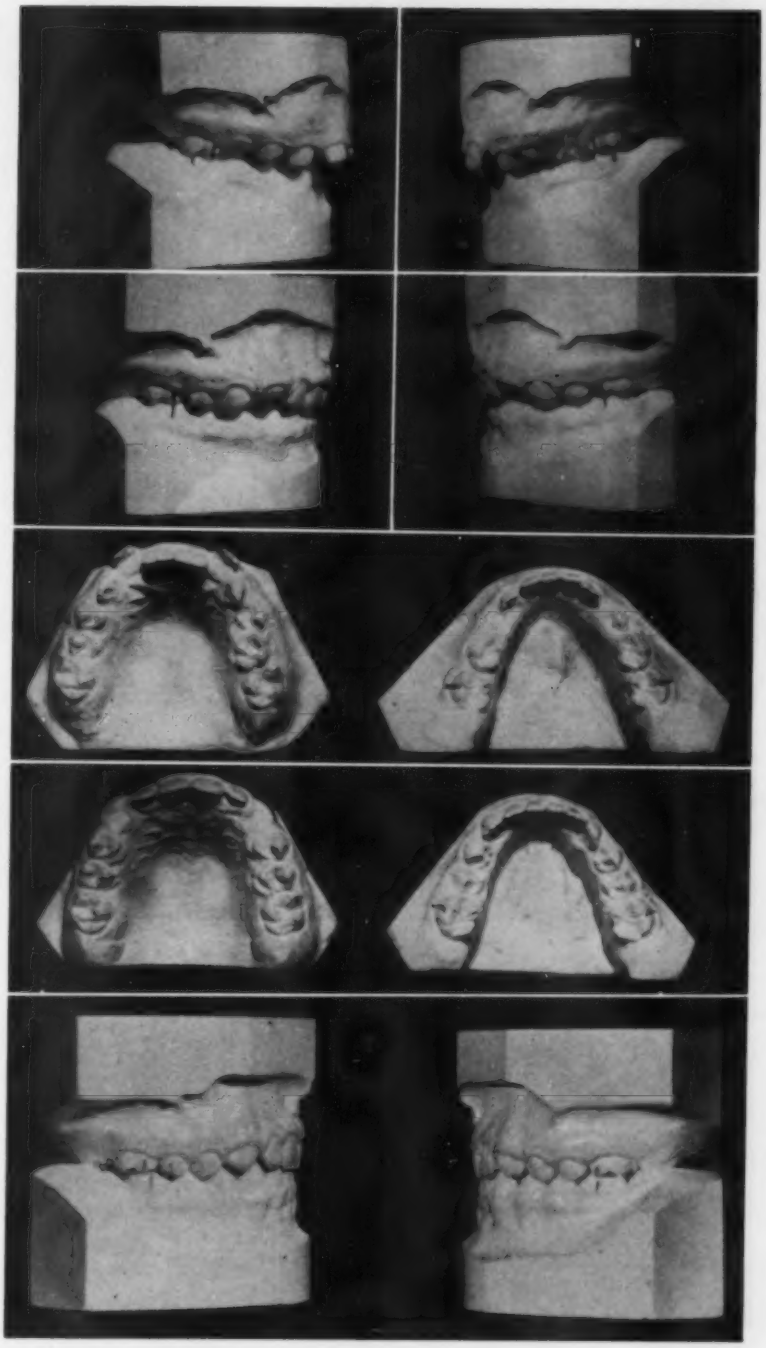


Fig. 26.

Fig. 27.

Fig. 28.

Fig. 28 shows right and left views of case after five months of edgewise arch appliances in the maxillary arch which changed axial inclination of the incisors.

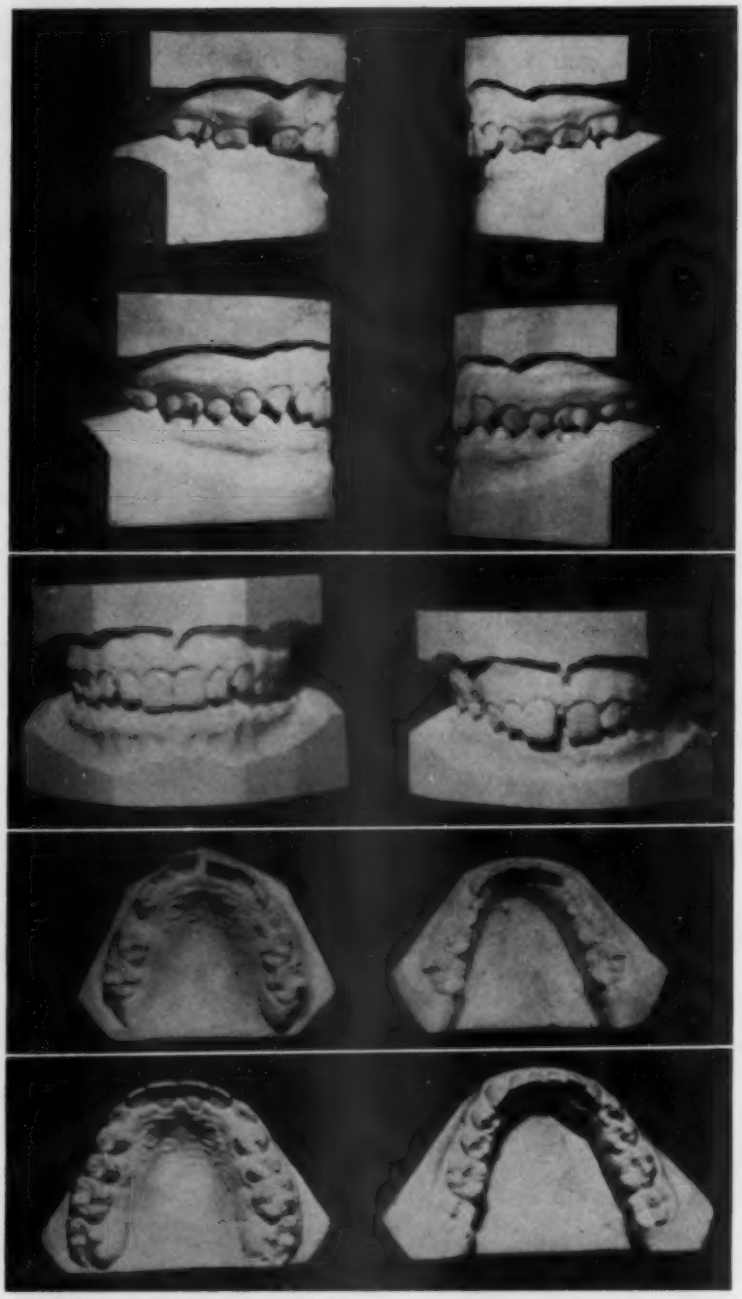


Fig. 29.

Fig. 30.

Fig. 31.

Fig. 29 shows upper right and left views of a Class I case with a deep overbite in a 9-year-old patient. A palatal bite plane with a Hawley wire was placed to unlock the occlusion and permit better alveolar growth.

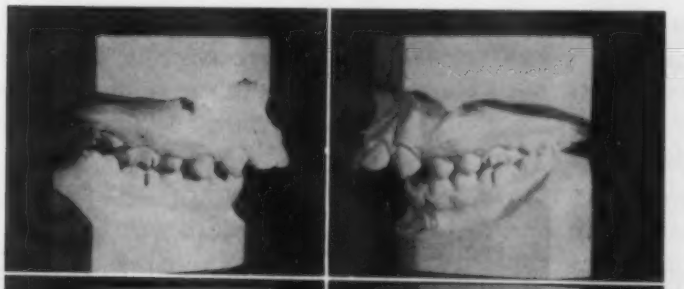


Fig. 32.

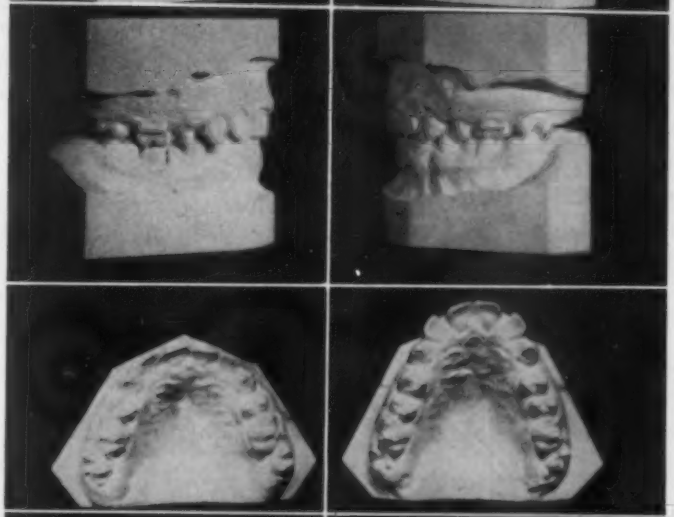


Fig. 33.

Fig. 34.

Lower models were taken two years later. There has been good growth with fair occlusion. The maxillary canines have not erupted to their full clinical crown length but there is sufficient space, and they are in good relationship to the adjoining teeth. The overbite has not been corrected sufficiently, which was an error on my part.

Fig. 30 shows front views of models before and after.

Upper models in Fig. 31, occlusal view before wearing bite plane; lower models, occlusal view taken two years later. There was an early loss of the right mandibular deciduous canine with a partial closing of the space. Unlocking occlusion permitted better growth of the alveolar process with an increase in width in the canine area. This I believe would not have occurred with the closed bite.

Upper models in Fig. 32 are right and left views of a boy 14 years of age. The molars are in Class I relationship, but the face is that of a severe Class II, Division 1 malocclusion. The lower models are right and left views after twenty months of treatment. The right and left maxillary and mandibular first bicuspids were removed. The edgewise appliance was placed, banding all the teeth including second molars. The contact points were all closed, moving the upper teeth distally by the use of occipital anchorage. There were no intermaxillary elastics used at any time.

Fig. 33 shows occlusal views, right models, before treatment, left models, twenty months later. Arch length in maxillary arch from the buccal groove of the first molar to the midline was decreased from 49 mm. to 36 mm. Arch width in the maxillary first molar was decreased from 56 to 54 mm. Mandibular arch length from buccal groove of 6-year molar to midline was decreased from 52.5 to 49 mm. Consider what tissue changes must have occurred by decreasing maxillary arch length 13 mm. and mandibular arch length 3.5 mm.

Fig. 34 shows photographs of the patient, upper, before treatment, lower, after twenty months of treatment and eighteen months of retention. For retention, bands were placed on the molar with a round arch and headcap worn at night. I did not see this boy until he was 14 years of age, and he is one of many patients who would have responded to good mixed dentition treatment.

In the photographs taken after treatment, you can see the strain on the facial musculature necessary to keep the lips closed. At rest the lips are still open and the facial balance leaves much to be desired. The mandibular arch form and balance, as well as tooth relationship to the mandible, were good. If the maxillary teeth had been moved distally at about the age of 7, facial musculature and lip development could have improved facial balance and esthetics. The patient would have had a much shorter treatment period, with less destruction, with less loss of tissue and a more stable result.

Psychologically much could have been accomplished for this patient by treatment at an earlier age.

If we are going to advance in our clinical approach to malocclusion and facial abnormality, it seems evident that more time and study must be done on "when to institute mechanical therapy." Treatment at an early age while

we can guide and direct alveolar growth and eruption of the teeth, thereby stimulating better development of environmental forces to produce a more balanced face and a more stable occlusion, is necessary.

A successful approach will demand a change in many of our past analyses and treatment methods. We must segregate our thinking, analysis, and clinical approach, between dentition with all the permanent teeth and mixed dentition.

The mixed dentition problem must be viewed as a growing, developing face which in malocclusion is progressing in an abnormal path with an unbalance of facial parts which must be guided into better balance and relationship. Our first consideration must be to determine what part of the face is in best balance to the environmental forces of the face, and which teeth are in best relationship and position to the supporting facial bones. Our objective must be to guide the malpositioned teeth in correct position, relationship, and balance without disturbing those that are in good position and balance.

We must work with nature and give the denture and alveolar bone every possible opportunity for their optimum growth and development. If this is done early while there is still considerable growth to follow, corresponding changes and adjustments will occur in the soft tissue and musculature of the face. Arch length in the mandibular arch can be increased in many cases. Arch width has increased without influence from appliances when occlusion was unlocked to permit better alveolar bone growth. Therefore, we can conclude that there are cases in which arch width can be increased with appliances if it is done early and with care and good judgment. We must remember that arch length and width cannot be extended beyond their balance to the environmental forces. And, above all, this mandibular arch cannot be used for anchorage in Class II malocclusion after arch length and width have been increased. From this we must conclude that one of our major problems in clinical orthodontics is anchorage, to which we must give more time and study.

SUMMARY AND CONCLUSION

1. The time to start orthodontic treatment is a basic problem in treatment in which the profession should have more uniformity of thought and practice.

2. Trends in orthodontics have frequently impeded the progress of our science. We must have a good knowledge of the fundamental sciences and stay abreast with findings of our scientific worker to give our patients the best possible treatment and make contributions to the advancement of orthodontics.

3. Orthodontics is an applied science in which we must have principles which are applicable to each individual case. Many of our pitfalls are the results of looking for and blindly following rules of treatment which have results in mechanical concepts without consideration of the biological reaction.

4. Treatment during the mixed dentition period has been neglected, permitting many cases of malocclusion to reach such a severity that it is impossible to obtain a well-balanced result.

5. Mechanical forces applied to the teeth will not influence the growth of the facial bones nor change their pattern. We can change position and relationship of the teeth, thereby guiding alveolar bone growth. This will influence growth and development of facial musculature and produce a better functioning denture and a better facial esthetic result.

6. The otpimum growth and development of the denture, alveolar bone, and forces of occlusion require the best possible functioning relationship of the teeth at an early age.

7. Early treatment will require a change in analysis and treatment plan with special consideration of anchorage.

8. The philosophy of mixed dentition treatment should be guiding alveolar bone growth and the eruption of the teeth, thereby producing a more stable result with less destruction and loss of tissue. It seems logical and expedient to accomplish this with the minimum amount of mechanical appliance.

I believe the evidence presented is encouraging enough to warrant this report; however, it is not intended as a solution to all mixed dentition problems. There is still much more to be done. We must give more thought and work toward analysis and methods of treatment in mixed dentition if orthodontics is to advance and make our science available to a greater number of people.

REFERENCES

Broadbent, B. Holly: A New X-ray Technique and Its Application to Orthodontia, Angle Orthodontist **1**: 45-66, 1931.

Broadbent, B. Holly: The Face of the Normal Child, Angle Orthodontist **7**: 183-208, 1937.

Brodie, Allan G.: Retention, Angle Orthodontist **9**: 3-16, 1939.

Brodie, Allan G.: Facial Patterns. A Theme in Variation, Angle Orthodontist **12**: 75-87, 1946.

Brodie, Allan G.: Orthodontic History and What It Teaches, Angle Orthodontist **4**: 85-97, 1934.

Brodie, Allan G.: On the Growth of the Jaws and Eruption of the Teeth, Angle Orthodontist **12**: 109-124, 1942.

Chapman, Harold: The Age for Orthodontic Treatment, INT. J. ORTHODONTIA **13**: 144-160, 1927.

Flint, Willard: Early Treatment in the Correction of Malocclusion, Report of Annual Meeting of American Society of Orthodontia, Oct. 2, 1907.

Kelsey, Harry: When Should Treatment Be Begun? INT. J. ORTHODONTIA **14**: 572-575, 1928.

Oppenheim, Albin: Biologic Orthodontic Therapy and Reality, Angle Orthodontist **6**: 69-116, 153-180, 1936.

Thompson, John R.: The Rest Position of the Mandible and Its Application to Analysis and Correction of Malocclusion, Angle Orthodontist **19**: 162-188, 1949.

Wylie, Wendell: Malocclusion—Malady or Malformation, Angle Orthodontist **19**: 3-12, 1949.

ZUELKE BLDG.

MALOCCLUSION IN ANDROGEN-TREATED MONKEYS

BERT G. ANDERSON, D.D.S., C. M. SEIPEL, D.M.D., AND G. VANWAGENEN, PH.D.,
NEW HAVEN, CONN.

THIS report presents observations on occlusal deformities found in androgen-treated monkeys, and implies an etiological basis similar to that associated with certain occlusal defects in human beings.

Even a cursory survey of the literature yields ample evidence that achondroplastic dwarfs have aroused man's curiosity since early historic times. Owing to their peculiar deformity, they have been in demand as entertainers by kings at court and by the public on the stage. In more modern times they have claimed the interest also of medical investigators.

According to Stockard, "Parrot has won the credit of having recognized the affection as an independent form of disease in a number of fetuses and of having described it in 1876. He introduced the name 'achondroplasia,' also used by Porak in 1891, and by P. Marie in 1900 when they pointed out that some of the fetuses as described by Parrot reached maturity in spite of their poor chances of life.

"Kaufmann, in Germany, afterwards adopted the name 'chondrodystrophia,' thereby indicating that the affection is distinguished less by an absence of the 'cartilage' than by a disturbance of its nutrition."

In a pathological-anatomical report, Knötzke (1929) described the deficient basicranial development of a newborn achondroplastic dwarf. Howard (1936) published a paper drawing the attention of the orthodontists to peculiar facial deformities, which he designated acromegaloid, associated with endocrine dysfunction. Stockard (1941) extended the investigation of similar occlusal deformities to animals, utilizing well-established breeds of dogs, and approaching the subject from a genetic and endocrine viewpoint (Fig. 1, *A*, *B* and *C*). A report on this material was made by Johnson (1940), who emphasized the influence on dental occlusion of the chondrodystrophy at the base of the cranium. Anderson (1939) described an open-bite deformity observed in six of eight oriental patients who had untreated congenital syphilis during the developmental period of their dentitions (Fig. 2, *A*, *B*, and *C*). Johnston, Anderson, and McAlenney (1941) reviewed the medical records of thirty-six white patients with positive serology, all of whom had received antisyphilitic treatment which may have influenced their dental development. Eight of these patients showed

The hormone-treated and control monkeys reported upon here were a part of an extensive research on acceleration of growth. These animals were born in the obstetrics monkey colony, Yale University School of Medicine, New Haven, which was established in 1931 and now consists of six generations of this rhesus monkey (Macaca mulatta).

The investigation was supported by research grants from the National Cancer Institute of the National Institute of Health, United States Public Health Service, and the Joseph Purcell Memorial Research Fund of the Yale University School of Medicine.

Read before the Northeastern Society of Orthodontists, New York City, March, 1952.

the same type of open-bite just mentioned. In several instances syphilis in this group had been complicated with rickets during infancy. Anderson and Hurme (1940) described a similar open-bite observed in a group of postrachitic children (Fig. 3, *A*, *B*, *C*, *D*, and *E*).

Fig. 1.—*A*, English bulldog. *B*, Achondroplastic dwarf. *C*, Androgen-treated monkey. (From Stockard: The Physical Basis of Personality, W. W. Norton & Company, Inc.)

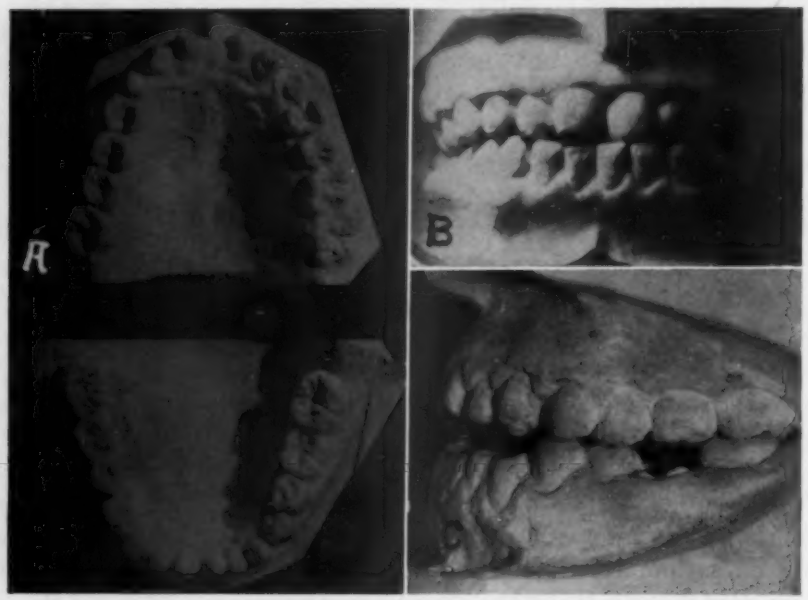


Fig. 2.—Models of Chinese permanent dentitions from patients who had congenital syphilis during developmental period of teeth. *A*, Shows marked dwarfing of maxillary and mandibular anterior six and four first molar teeth. Compare sizes of first and second molar teeth. Note latter are more fully developed. *B*, Models of dentition with lesser dental changes and with edge-to-edge bite while in centric occlusion. (Chinese commonly exhibit deep overbite.) *C*, Models of dentition with moderate degree of dwarfing of maxillary and mandibular anterior six teeth and four first molar teeth, and showing typical open-bite malocclusion.

vanWagenen (1941) published a preliminary report on changes observed in two experimental animals (rhesus). The main purpose of this presentation is to report on the dental occlusal findings of these animals since no reference was made to such changes in her publication. These animals received 3.75 mg. of testosterone propionate per kilogram intramuscularly twice a week: one from 7 months, 6 days of age until 3 years, 5 months, 21 days of age; the other

from 6 months, 21 days until 3 years, 5 months, 11 days old. Fig. 4, *A*, *C*, and *D* shows experimental animal A618 at 2 years, 7 months, 19 days, and *B*, control animal B625 at 2 years, 6 months, 24 days.

According to vanWagenen, "The bone age of seven year old male rhesus monkeys is comparable to that of the human of twenty years. During the sixth year the upper epiphyses of the long bones unite, the gonads contain mature sex cells and the pelage is that of the mature male. Two experimental monkeys, two years and ten months old, presented the above signs of maturity. From the beginning of treatment, seven months of age, weight was fifty per cent greater than the heaviest male recorded. X-ray films showed a massive increase in the musculature with an accompanying accentuation of contour and thickness of bone. Body length, although it immediately rose from the average curve, did not exceed greatest normal length because of the imposed process of maturation which was thought to be a function of the androgen dosage.

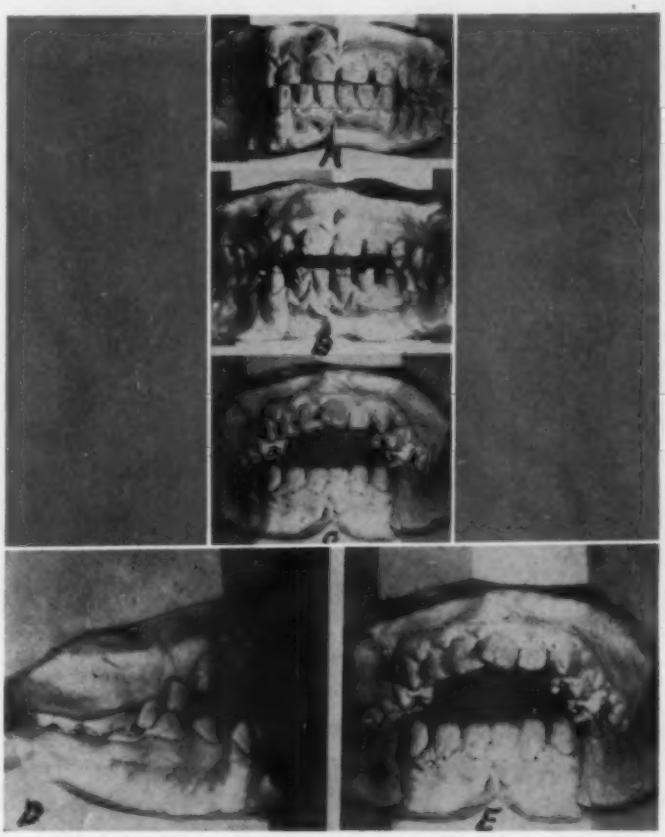


Fig. 3.—*A*, *B*, *C*, *D*, and *E*, Models showing degrees of malocclusion (open-bite) in postrachitic patients.

"A testis of the control animal removed at two years, eight months showed tubules containing only basal cells, while glands of the treated animals, two and three times as large, showed complete spermatogenesis. The control mammary gland, one centimeter in diameter, was composed of spidery, thin-walled simple

ducts. The mammary gland of the treated animal was also of neonatal size, but the ducts stained heavily, were distended, and the terminal ends showed proliferating epithelium. The silky, short hair characteristic of the young monkey changed to adult type during the second year and thereafter appeared longer and more luxuriant than that of the usual laboratory adult male."

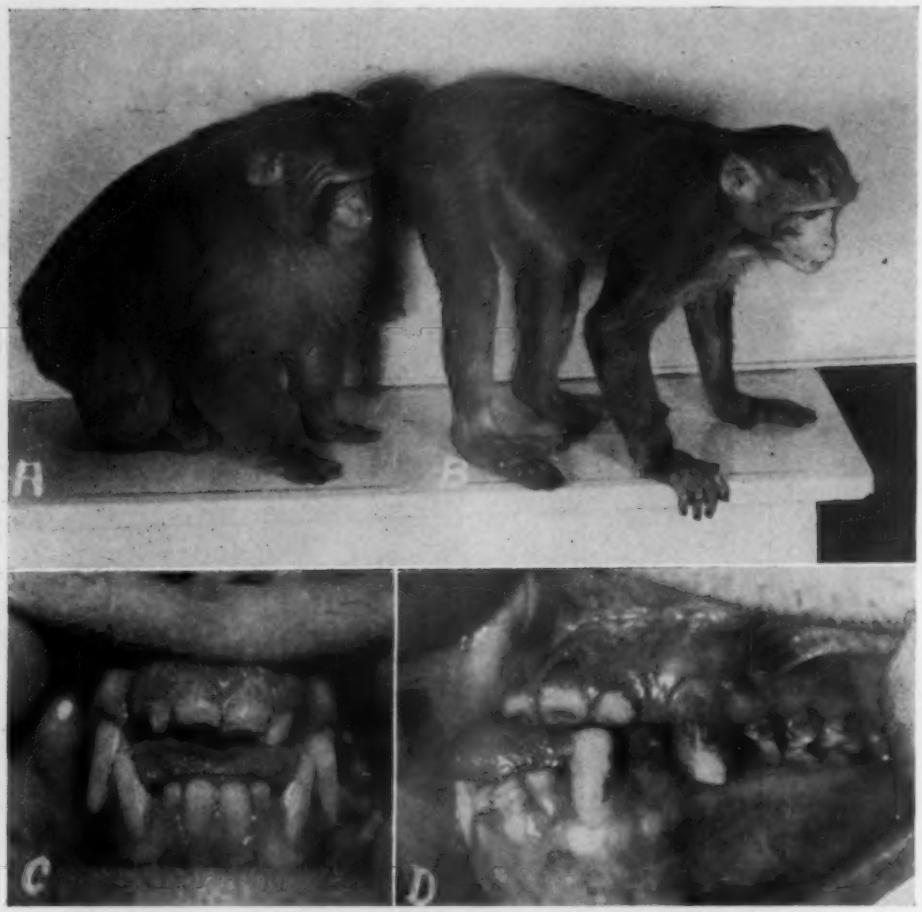


Fig. 4.—*A*, Androgen-treated animal (618); treatment begun at 6 months of age. *B*, Control animal (625). *C*, Photo showing front view of bite of treated animal at 4 years, 8 months. *D*, Photo (same animal) showing side view at 6 years, 11 months. Note (1) side tongue, probably part of general enlargement of musculature, (2) open-bite and wide space between maxillary and mandibular canines, probably mainly owing to failure of forward growth of maxilla, but also partially owing to forward thrust of mandible.

The skeletal structures of the head of one of the experimental animals are shown in the roentgenogram seen in Fig. 5. It is obvious that this head is deformed. The jaws, particularly the maxillae, have failed to grow sufficiently to accommodate the complete denture. Consequently, there is marked crowding of the teeth with attendant failure of eruption of the third molars, and an open-bite chiefly the result of the defective condition of the maxillae and associated bones. In general, the face, jaws, and dental occlusions resemble those observed in the English bulldog and those associated with certain diseases in human

beings. This condition of the maxillae is well known and attributed, in the orthodontic literature, to an "arrest" of bone growth. It seems in these instances rather to be the result of accelerated growth or maturity causing premature calcification of the basal skull cartilages.

In the instances just cited (androgen-treated monkeys, English bulldog, achondroplastic dwarf, rachitic children, and children with congenital syphilis), growth disturbance through systemic disease seems to have produced these malocclusions during development. A specific etiologic agent was demonstrated in the case of the experimental animals.

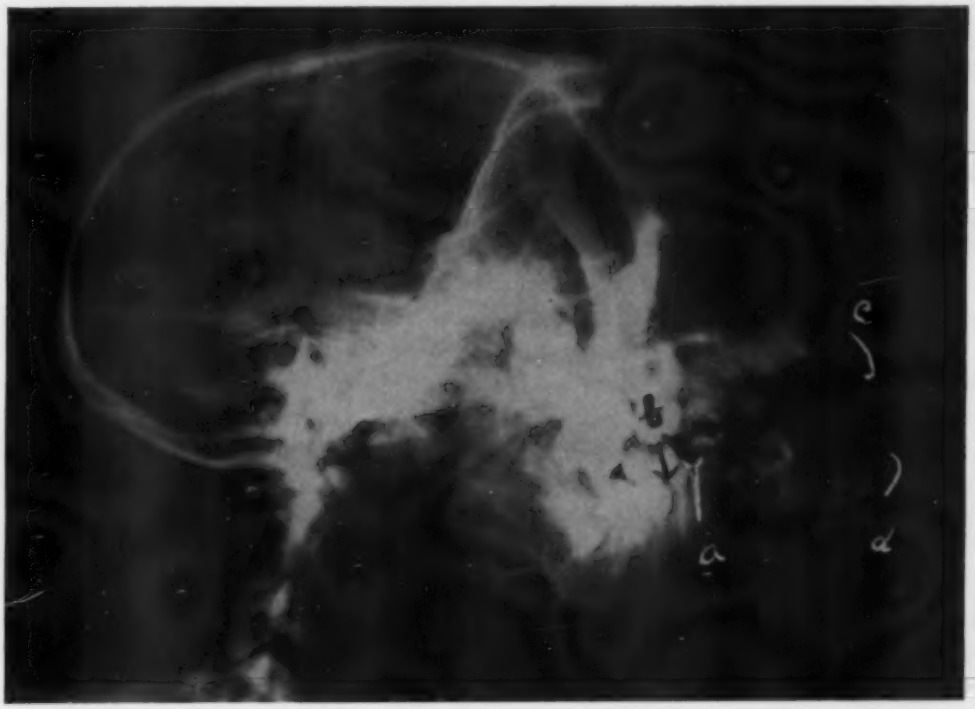


Fig. 5.—X-ray of skull and jaws of test animal. *a* and *b*, Arrows indicate first molar relationship. Growth failure most marked in maxillae attended by crowding of teeth and openbite (*c* and *d*) (canines were extracted at maturity because of vicious habits of animal). (Further comment on x-ray observations will not be made at this time. The malocclusions observed in these animals and their possible implication to some similar defects in man are presented here chiefly from a clinician's standpoint. An anthropometric analysis of the skeletal material made by one of the authors will follow in a later publication.)

Since nothing other than the administration of testosterone propionate was intentionally given to these animals during the experiment, it seems reasonable to attribute their occlusal deformities to the effects of this androgen.

REFERENCES

1. Stockard, Charles R.: The Genetic and Endocrine Basis for Differences in Form and Behavior, Philadelphia, 1941, The Wistar Institute of Anatomy and Biology, pp. 149-383.
2. Knötzke, Fritz: Bemerkungen zur Wirbelsaure des Chondroystrophen, Beitr. z. path. Anat. u. z. allg. Path. **81**: 547-567, 1929.
3. Howard, Clinton C.: Acromegaloid Growth and Dwarfism, INT. J. ORTHODONTIA **22**: 992, 1936.

4. Johnson, A. LeRoy: The Constitutional Factor in Skull Form and Dental Occlusion, AM. J. ORTHODONTICS AND ORAL SURG. 26: 627-663, 1940.
5. Anderson, Bert G.: Dental Defects in Congenital Syphilis, Am. J. Dis. Child. 57: 52-57, 1939.
6. Johnston, Wilbur D., Anderson, Bert G., and McAlenney, Paul F.: Effects of Congenital Syphilis on the Teeth and Associated Structures in Children, AM. J. ORTHODONTICS AND ORAL SURG. 27: 667-680, 1941.
7. Anderson, Bert G., and Hurme, Veikko, O.: Malocclusion in a Group of Postrachitic and Nonrachitic Adolescent Children, AM. J. ORTHODONTICS AND ORAL SURG. 26: 1119-1130, 1940.
8. vanWagenen, G.: Maturity Induced by Testosterone in the Young Male Animal, Federation Proc. 6: 219, 1947.

STUDIES OF DENTOFACIAL MORPHOLOGY. II. ORTHOMETRIC ANALYSIS OF FACIAL PATTERN

WILLIAM A. ELSASSER, A.B., B.S., D.D.S.,* WASHINGTON, D. C.

THE first requirement for the solution of any problem is an objective definition of the problem itself. Orthodontists and allied investigators have devoted considerable time to the formulation of an objective definition of malocclusion. Angle's[1] definition, together with his classification, gave the profession its first systematic approach to the problem.

The Angle classification is commonly employed today for the qualitative description of malocclusion. The subjective nature of the classification has, however, prevented its application to the measurement of degrees of severity of the condition. An objective method is desirable for precise individual diagnosis and especially for measuring the incidence and prevalence of malocclusion. Furthermore, the results of an epidemiological investigation of malocclusion should be readily reproducible by other investigators.

In order to describe malocclusion in quantitative terms, Simon[2] evolved a system of diagnosis which made it possible for orthodontists to diagnose malocclusion more precisely by relating it to facial landmarks. With the advent of the Broadbent-Bolton roentgenographic cephalometer, Simon's methods became less useful.[3] Cephalometry is currently a satisfactory method for measuring malocclusion in relation to facial pattern. Several cephalometric methods[4, 5, 6] are now available to the practitioner for analysis of dentofacial pattern.

Epidemiologic Considerations.—The epidemiologic treatment of data concerning dentofacial deformities, however, requires a shift of emphasis from the individual to the group. Determination of the frequency of malocclusion in various populations requires the measurement of large numbers of children. In several previous epidemiologic studies,[7, 8, 9] the investigators have enumerated the Angle classes found in the individuals of the study communities. Reports of such investigations yield only the number of cases of malocclusion in a given community with no indication of the relative severity of the condition.

Massler and Frankel[10] have refined epidemiologic procedures based upon enumeration of the Angle classes of malocclusion by recording also the malpositions of individual teeth. Their method enabled them to specify the degree of severity of malocclusion prevalent in a given community.

It has become clear that complete understanding of the epidemiology of malocclusion is dependent upon rapid, simple, and adequate examinations of individuals. The picture must be completed by an accurate assessment of dentofacial pattern. In order to record the degree of malocclusion prevalence

Awarded honorable mention, 1952 Prize Essay Contest, American Association of Orthodontists, St. Louis, Mo., April 22, 1952.

*Senior Assistant Dental Surgeon, Division of Dental Resources, United States Public Health Service.

in a specific community, an index is required which will summarize quantitatively the condition being surveyed on both an individual and a group basis.

The cephalometer, an excellent instrument for determining the relationship of the teeth and facial pattern, has definite limitations for mass surveys. These include a large capital outlay, lack of portability, and high cost of the film.

The facial orthometer,[11] however, on the basis of actual field tests, is well suited to epidemiologic studies (Fig. 1). This instrument assesses dentofacial pattern on a basis different from that of the cephalometer.[5, 11] The nature of the difference emphasized the need for an index specific for orthometric measurement. Such a measure, the dentofacial index (D.F.I.) is described in the following section.

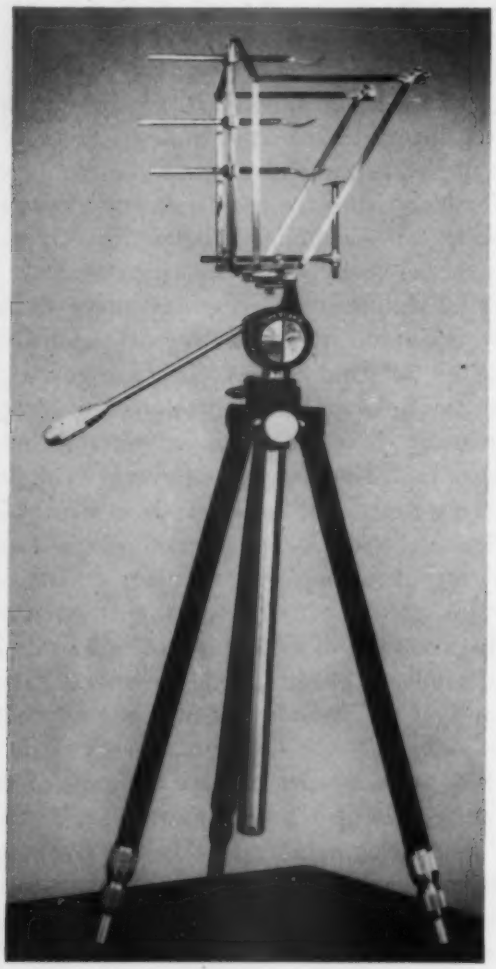


Fig. 1.—The orthometer set on its tripod.

Dentofacial Pattern Analysis With the Facial Orthometer.—The technique of measurement and the recording of data necessary for the calculation of the D.F.I. have been described in a previous communication.[11] Briefly, the index is a measure of dentofacial morphology based upon the degree of departure of

midline facial points from a vertical plane perpendicular to Frankfort horizontal and dropped through a point 20 mm. anterior to nasion. In addition to these measurements, the index includes the proportion of upper facial height to total facial height and a notation of the presence or absence of cross-bite and crowded dental arches.

In order to establish a standard index, it was necessary to observe ideal dentofacial patterns in quantity sufficient to validate the concept statistically. Two cities in Idaho, Nampa and Coeur d'Alene, were selected for the pilot study because of the stability of the population and the high percentage of native-born white children. A total of 909 children between the ages of 6 and 12 were examined. Of this total, 366 lived in Coeur d'Alene and 543 in Nampa.

OCCLUSION					
			m.m.		m.m.
Type		P-N		N_y	
Closebite		P-Sn		Sn_y	
Crossbite		P-UI		LCP_y	
Upper Protrusion		P-LI			
Lower Protrusion		P-Pg			

Fig. 2.—The record form used in the recent Idaho study.

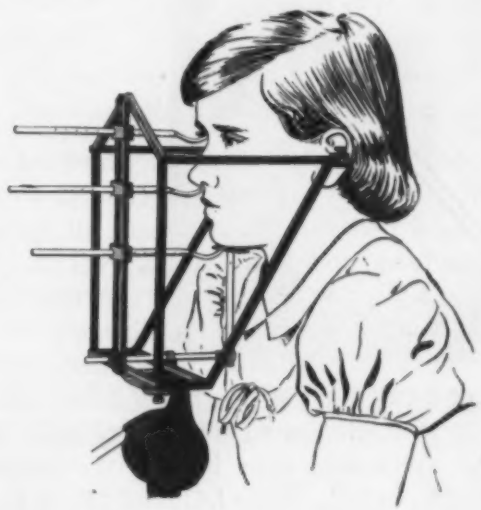


Fig. 3.—Schematic drawing of the child in position ready for orthometric observation.

Letters were sent to the parents of all children in the community to determine the nativity and history of residence of each child. Only native-born white children with a history of uninterrupted residence in study cities were selected. No effort was made to select children on the basis of age or sex. Since the dentofacial index (D.F.I.) is conceived in terms of departure from a vertical plane outside the skull, and since *ideal* occlusions were selected by inspection, all dimensions derived from these *ideals* would be within the range of ***normality***.

The effect of age and sex on the range of *normality* was considered in the preliminary analysis of the data. Calculation of age-specific and sex-specific

indices resulted in a negligible narrowing of the *normality* range. The statistical validity was not improved sufficiently thereby to warrant giving up the convenience of a single index for all sex and age groups.

All examinations were performed at the schools in the following manner: First, a clinical examination was performed for determination of gross abnormalities such as crowded arches, upper protrusion, cross-bite, lower protrusion, and close-bite. These were entered on the record form by a plus (+) if present and by a minus (–) if absent (Fig. 2). If none of these defects was present, an "N," for normal, was entered opposite "type" in the record form. If the case was not an *ideal* occlusion, the appropriate Angle class was noted instead of the "N." Next, the child was placed in the orthometer for the required measurements (Fig. 3). The entire orthometric examination averaged 1½ minutes.

The measurements recorded were as follows:

P to N	Plane (vertical measuring plane of the instrument) to nasion.
N_v	Nasion level (vertical scale reading).
P to Sn	Plane to subnasion.
Sn_v	Subnasion level (vertical scale reading).
P to UI	Plane to upper incisor.
P to LI	Plane to lower incisor.
P to Pg	Plane to pogonion.
LCP_v	Lowest chin point (vertical scale reading).

Statistical Methods Used in Arriving at a Standard.—The above readings were recorded without regard to the vertical plane located 20 mm. anterior to nasion. It was therefore necessary to translate all horizontal measurements into distances of midline facial and dental points from the plane of the reference. The latter is referred to as P_1. By assigning a constant value of 20 mm. to the dimension (P_1 to N) for all individuals, the distances of Sn, UI, LI, and Pg from the reference plane were calculated. The constant 20 mm. is subtracted from (P to N), the recorded dimension. The difference (P to N) – (P_1 to N) or (P to N) –20 was in turn subtracted from (P to Sn), (P to UI), (P to LI), and (P to Pg). The differences thus became the individual values of the dimensions (P_1 to Sn), (P_1 to UI), (P_1 to LI), and (P_1 to Pg). These dimensions are illustrated in Fig. 4.

Data on vertical dimensions were handled in the following manner: (N_v to Sn_v) equals upper facial height. (N_v to LCP_v) equals total facial height. Upper facial height divided by total facial height multiplied by 100 equals a proportion, expressed in percentage, of upper facial height to total facial height. The above operation was carried out on each record form. After all cards were completed, the mean and standard deviations were calculated for each of the dimensions (P_1 to Sn), (P_1 to UI), (P_1 to LI), (P_1 to Pg), and $\frac{\text{upper face height}}{\text{total face height}} \times 100$, on those cards which indicated that the child possessed a clinically *ideal* dentofacial pattern. It will be recalled that such cards were marked with the letter "N" during the school examination.

A weight varying from 0 to 3 was assigned to each dimension and the proportion mentioned above. If a particular dimension was within one standard deviation (plus or minus), the weight assigned was 0; if within two standard deviations, the weight 1 was assigned; if within three standard deviations, the weight 2 was assigned; and, if outside the limits of three standard deviations, the weight 3 was assigned.

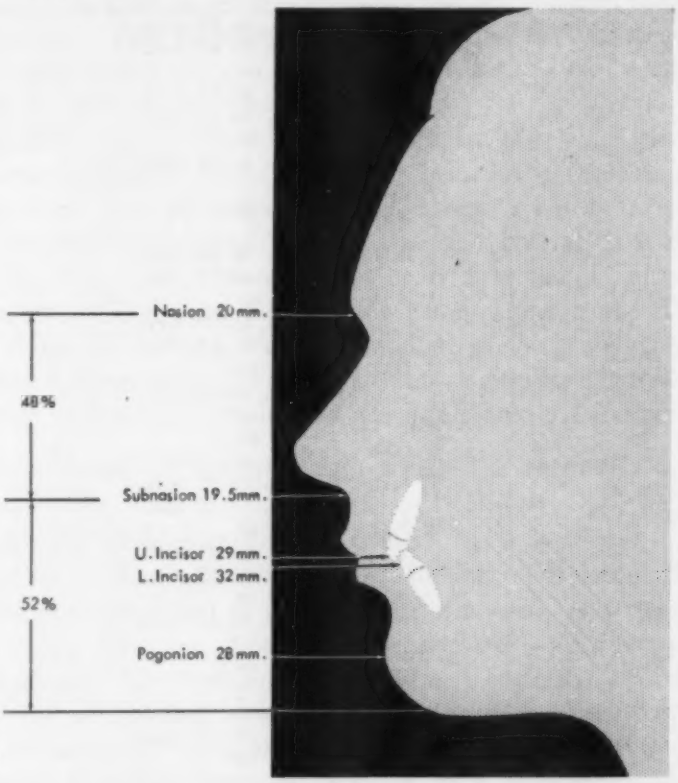


Fig. 4.—Mean dimensions and proportion used in the orthometric standard. The junction of the black and white areas represents the plane of reference. Horizontal distances indicated are from the plane of reference to the anatomical points at the heads of the arrows. The percentages noted represent the proportion of upper face height and lower face height to total face height.

Data were also collected on the frequency of cross-bite and crowded dental arches. Owing to a lack of objectivity in the intraoral observation of these conditions, record entries were weighted as follows: If present, each condition

TABLE I. THE ORTHOMETRIC STANDARD

DIMENSION	MEAN	RANGE OF 1 S.D.
P_1 to Sn	19.5 mm.	16 mm. to 23 mm.
P_1 to UI	29.0 mm.	24 mm. to 34 mm.
P_1 to LI	32.0 mm.	27 mm. to 37 mm.
P_1 to Pg	28.0 mm.	23 mm. to 33 mm.
$\frac{\text{Upper Face}}{\text{Total Face}} \times 100$	48 per cent	46 per cent to 50 per cent
Intraoral observation		
Crowded arch	----	0
Cross-bite	----	0

was assigned a weight of 3. If absent, each condition was assigned a weight of 0. The assignment of a weight of 3 for "condition present" is believed justified because these conditions were either present or absent. If absent, each condition

TABLE II. THE WEIGHTING OF THE STANDARD DIMENSIONS FOR THE PURPOSE OF OBTAINING THE D.F.I.

DIMENSION		RANGE	WEIGHT
P_1 to Sn	1 S.D.	16 mm. to 23 mm.	0
	2 S.D.	16 mm. to 13 mm. or 23 mm. to 26 mm.	1
	3 S.D.	13 mm. to 10 mm. or 26 mm. to 29 mm.	2
	Over 3 S.D.	10 mm. − or 29 mm. +	3
P_1 to UI	1 S.D.	24 mm. to 34 mm.	0
	2 S.D.	24 mm. to 19 mm. or 34 mm. to 39 mm.	1
	3 S.D.	19 mm. to 14 mm. or 39 mm. to 44 mm.	2
	Over 3 S.D.	14 mm. − or 44 mm. +	3
P_1 to LI	1 S.D.	27 mm. to 37 mm.	0
	2 S.D.	27 mm. to 22 mm. or 37 mm. to 42 mm.	1
	3 S.D.	22 mm. to 17 mm. or 42 mm. to 47 mm.	2
	Over 3 S.D.	17 mm. − or 47 mm. +	3
P_1 − Pg	1 S.D.	23 mm. to 33 mm.	0
	2 S.D.	23 mm. to 18 mm. or 33 mm. to 38 mm.	1
	3 S.D.	18 mm. to 13 mm. or 38 mm. to 43 mm.	2
	Over 3 S.D.	18 mm. − or 43 mm. +	3
$\frac{\text{Upper face}}{\text{Total face}} \times 100$	1 S.D.	46 per cent to 50 per cent	0
	2 S.D.	46 per cent to 44 per cent or 50 per cent to 52 per cent	1
	3 S.D.	44 per cent to 42 per cent or 52 per cent to 54 per cent	2
	Over 3 S.D.	42 per cent − or 54 per cent +	3

Intraoral Observation	*Present or Absent*	*Weight*
Crowded arch	−	0
	+	3
Cross-bite	−	0
	+	3

An ideal dentofacial pattern would be the sum of all variables within one standard deviation of the mean or 0.

was within one standard deviation of the mean. If present, the condition was over three standard deviations from the mean, since the mean and standard deviation in ideal cases were zero for both cross-bite and crowded dental arches.

After weighting of the dimensions, proportion of upper to total face, and intraoral observations, the resulting values on each record form were summated. The sum of these weights constitutes the dentofacial index (D.F.I.). Thus the index may vary from 0 in an ideal dentofacial pattern to 21 in the most extreme dentofacial pattern. This statement follows from the fact that each dimension, the facial proportion, and the two intraoral conditions can be weighted 0 in the ideal case or 3 in the extreme. (See Table II.)

The dentofacial index (D.F.I.) is merely an expression of the additive effect of several individual variables. For instance, an ideal occlusion and facial pattern would have an index of 0. An extreme mandibular retrusion with a closed-bite may have an index of 14 depending on the severity of the conditions.

In addition to its use in assessing an individual case of malocclusion, the dentofacial index (D.F.I.) can be used for group assessment. This is accomplished by deriving an index for each individual in the population sample and then calculating a mean value for the entire sample under observation.

Compilation of the data obtained in the Idaho study follows:

Orthometric Study of School Children, aged 6 through 12, Nampa and Coeur d'Alene, Idaho.

Total number of children examined, 909.

Total number of clinically ideal dentofacial patterns found, 93.

The orthometric standard is composed of the mean and the range of one standard deviation for each dimension, proportion, and intraoral condition under consideration. The first column of Table I indicates the object of each measurement, the second indicates the mean for each measurement, and the third column the range of one standard deviation. Any observed measurement within the range shown in the third column may be considered as *ideal* for purposes of this analysis.

Table II indicates the method by which the weight is assigned each individual measurement. In the first column, the object of each measurement is indicated. In the second column, the ranges of one, two, and three standard deviations are shown for each object. The third column illustrates the weight assigned to each standard deviation range.

DISCUSSION

The dentofacial index (D.F.I.) is primarily an epidemiologic tool. It can be used to assess both individual dentofacial patterns and the average dentofacial pattern of the entire group under consideration. On an individual basis, the orthometric standard dentofacial pattern can be used as a diagnostic aid to compare orthometric analysis of the individual case of malocclusion with the standard. As treatment progresses in the individual, the orthometric findings should change, and thus it will be possible to assess objectively what has been accomplished by treatment during a given period of time.

The long-range possibilities of orthometric analysis, however, lie in epidemiologic investigations of large population groups. Significant differences in group dentofacial indices suggest some underlying cause. The discovery of groups with relatively low indices will prompt further investigation designed to find the causes for such low indices. It is possible that such investigations may uncover evidence on which to initiate preventive orthodontic programs.

Further investigation, with the consequent increase in data, will lead to the use of the dentofacial index (D.F.I.) as an individual diagnostic aid in determining the border line between functional occlusion and malocclusion requiring treatment.

SUMMARY

The indications for a more adequate means of studying the epidemiology of malocclusion have been presented. The orthometric analysis of dentofacial pattern through the use of the dentofacial index (D.F.I.) has been suggested as a possible aid in the solution of the epidemiologic problem. Future possibilities include investigation of large population groups through surveys, the investigation of preventive orthodontic measures, and the use of the dentofacial index (D.F.I.) as a diagnostic aid.

REFERENCES

1. Angle, Edward H.: Treatment of Malocclusion of the Teeth, ed. 7, Philadelphia, 1907, The S. S. White Dental Mfg. Co.
2. Simon, Paul W.: On Gnathostatic Diagnosis in Orthodontics, INT. J. ORTHODONTIA 10: 755-777, 1924.
3. Broadbent, B. Holly: The Face of the Normal Child, Angle Orthodontist 7: 183-208, 1937.
4. Wylie, W. L.: Assessment of Anteroposterior Dysplasia, Angle Orthodontist 17: 97-109, 1947.
5. Downs, W. B.: Variations in Facial Relationships: Their Significance in Treatment and Prognosis, AM. J. ORTHODONTICS 34: 812-840, 1948.
6. Tweed, C. H.: Frankfort Mandibular Plane Angle in Orthodontic Diagnosis, Classification, Treatment Planning and Prognosis, AM. J. ORTHODONTICS AND ORAL SURG. 32: 175-221, 1946.
7. McFall, W. T.: Orthodontics as a Health Service, J. Am. Dent. A. 29: 1465-1470, 1942.
8. Brandhorst, O. W.: Will Orthodontics Become a Part of Government Health Programs for Children? J. Dent. Education 10: 138-143, 1946.
9. McCall, John Oppie: A Study of Malocclusion in Preschool and School Children, Dental Items Interest 66: 131-133, 1944.
10. Massler, Maury, and Frankel, John M.: Prevalence of Malocclusion in Children Aged 14 to 18 Years, AM. J. ORTHODONTICS 37: 751-768, 1951.
11. Elsasser, William A.: Studies of Dentofacial Morphology, Angle Orthodontist 21: 163-171, 1951.

PREDETERMINATION OF THE ADULT FACE

RAYMOND M. CURTNER, D.D.S., SAN FRANCISCO, CALIF.

RECENTLY, I asked a 6-year-old boy in the presence of his parents: "Bill, who do you look like, your father or your mother?" The reply so completely covered the subject that I have often thought about it, for he said, "Well, doctor, when I am with my dad everyone says I look like him; but when I am with my mother, everyone says I look like her, and when I am with my grandparents, I even look like them."

Perhaps, in the wisdom of a child, we can see how perfectly right he may have been, and how very wrong "everyone" really was. Perhaps we, too, may have mistakenly concurred with this method of analyzing the hereditary traits. We might possibly have even used this method of determining the facial pattern of Bill, or we might have considered it an unimportant factor in diagnosing Bill's future orthodontic troubles.

For many years, orthodontists have employed facial photographs and dental casts as the basis of orthodontic diagnosis and treatment planning. Doubtlessly, this has been reasonably accurate and adequate. With the great advances in orthodontic technique and thinking have come important advances in orthodontic research. With the advances in research studies have come important advances in orthodontic diagnosis and treatment planning. As the result of the Bolton cephalometer, throughout the country today there is an increasing use of the cephalostatic lateral head films. In the light of the evidence presented in the lateral head films, it would appear as though the time is not too far away when virtually every orthodontist will employ the lateral head film in his treatment of every child.

Few men will deny that Roentgen made one of the greatest contributions to the advancement of the medical sciences in all its history. Radiology has made great strides in the furtherance of all branches of science and industry, and it continues to assume an increasingly important place in all research. No other single method now available is so accurate and dependable as the Roentgen method and procedure in the diagnosis of human conditions and disorders, if carefully carried out. No other method permits the study of the living human being, in growth and development, disease and disorder, or familial structural characteristics.

True, we must recognize the limitations of the Roentgen technique in diagnosis, as there are many conditions where the roentgenogram can only confirm or rule out tentative conclusions derived by other methods. In presenting this work, I take full recognition of the limitations of the materials and the conclusions reached.

This thesis, which was given as a partial fulfillment of the requirements for certification by the American Board of Orthodontics, is being published with the consent and the recommendation of the Board, but it should be understood it does not necessarily represent nor express the opinion of the Board.

It might well be asked, "What is your objective, and what do you hope to solve in presenting this material?" In reply, I think I could say that these questions could best be answered by quoting from the article, "The Face and Its Development," by Rodolfo Tarasido. He has written, "It has been impossible up to the present time to establish with any certainty the particular reasons that make faces differ. There is not a *model* or a *measure to guide us*, and it is precisely this model that science is searching for . . . but, following more closely the constant and abundant contributions to the study of such a fascinating theme, it can be realized how deep is the problem confronting the investigators who devote so much of their time in attempting to solve the development problem, how to prevent its disagreeable consequences, and the scientific course to follow in the treatment and correction based on something more tangible than the *normal ideal.*" It is my hope that it is within the realm of probability that further studies of head films will disclose that we have a means of predetermining that model or measure to guide us in orthodontic treatment.

It is unnecessary to mention an array of authors and investigators to attempt to prove the predisposing influences of inheritance. Science has already acknowledged it. We accept its tendency for peculiarities and racial characteristics to be transmitted to the offspring. The hereditary development of the face, the resemblance of the parents, malformed teeth, peg teeth, and absence of teeth have quite definitely been proved to be the result of hereditary influences. It is true that most investigators believe that the hereditary influences can be modified by the regulating biogenetic activity of the progenitors.

Within the period of a relatively few years, we have witnessed great and important contributions to our understanding of the complex biologic process of growth and development of the human face. Today, it is possible to determine the skeletal pattern with great accuracy. We can determine within limits the correct anatomical position of the dentition in the skeletal face. We can determine the anterior-posterior dysplasia of the jaws. It is possible to measure the tooth substance in proportion to the supporting basal bone with a great deal of accuracy. However, we as orthodontists are still confronted with the ever-present problem, "Where is our model of the adult face for every child we treat?"

In 1944, Wylie published an investigation of an attempt to provide a quantitative method for comparing the cranial-facial patterns of various individuals of the population of whom cephalometric roentgenograms might be taken. Prior to this, the literature discloses no studies with head films directed toward the field of human heredity. In this work, he established a coefficient that might be used in determining variations in the human heredity pattern. By using the coefficient of variation, he was able to demonstrate the familial traits of human inheritance. The value of this work is demonstrated today by the increasing number of orthodontists who are employing the Downs-Wylie analysis of lateral head films as part of their diagnosis and treatment planning.

Of great interest is the conclusion that he reached relative to twins who outwardly are very similar, but who he found to have very dissimilar facial patterns.

Studies carried out in 1946 by Bayley on the relation of growth to skeletal age indicated that it is possible to estimate, with certain limits of error, the probable adult height of children whose growth is still far from complete. Here is a most important consideration, for if the orthodontist had merely to determine the breadth and height of the adult face by measurement, his problem would be greatly simplified. However, we are working with children, and in most cases have completed orthodontic treatment before the adult face is developed.

I am sure that for years orthodontists have been looking at the parents of their patients for that mental picture of the child's adult face. I am sure that they have accepted hereditary influences in their treatment planning. However, I question the accuracy of this method of predetermining the model. We are treating children at ages when their faces will not be fully developed for some time after treatment, and yet we are prone to base our treatment planning too heavily on the evidence of a dental cast, a tooth substance measurement, or a type of facial pattern. Can anyone deny that we have a "missing link," or perhaps "missing links" in orthodontic diagnosis and treatment planning? Even with the most careful analysis of models, lateral head films, and photographs, I can find in my practice cases in which there has been a gross error in treatment planning. In rechecking the analysis, the figures would indicate that I had followed correct procedure; however, the patient disproved that beyond a doubt. Something had happened after the completion of orthodontic treatment. It was not difficult to determine what had happened. The patient had grown. Yes, I had treated the case without consideration for the child's adult face.

Earnest A. Hooton has written, "In spite of the large number of geneticists engaged in teaching at universities and in carrying on research, there and in agricultural experiment stations, *human inheritance* is one of the most *neglected fields* of man's biology. The excuse usually given for this disgraceful situation is the length of the human life span which makes it impossible for anyone except a Methuselah to carry on observation over a number of generations and the impracticability of controlling the human subjects in their reproductive activities. There are, indeed, serious difficulties, but it is perfectly feasible to get the desired data by *observing parents and children and even siblings. . . .*"

Wylie quotes the work of Brodie (1941) as demonstrating that the facial pattern of an individual does not change after the third month, and hence deducts that one head film of an individual, taken at any age, should determine the facial pattern. This doubtlessly is correct and logical, if the analysis is based on the measurement of angles of intersecting anatomical planes. However, in the material to be presented, it is my opinion that serial films will have to be taken over the growth and development period of the children, or until the adult face is fully developed, if we are to investigate hereditary familial traits.

In the material herein presented, I have attempted to present sufficient evidence to prompt further investigation into hereditary influence by observing

parents and children through the medium of cephalostatic head films. This work which was begun approximately a year ago is continuing. Whether future results will disclose it to be of value, or whether it will merely show its limitations, at this point in the investigation it would appear to have a significant importance as a means to predetermine the adult face.

A few years ago, I observed during the tracing of cephalostatic head films in the process of making the Downs-Wylie analysis that there was a marked similarity of two children of different ages in the same family. Securing the head films of the parents and the children, tracings were made of all. Each of the children was in turn superimposed upon the tracing of the mother and father. Here it was observed that one child conformed very closely to the father, whereas the other two conformed closely to the mother. This prompted further investigation. By superimposing the head films upon each other and moving them from anatomical part to part, placing the frontal sinuses together . . . sella turcica . . . first cervical vertebrae . . . the mandible . . . it became even more apparent that hereditary influences had conformed one child to an almost identical structural similarity as the father, whereas the other two children conformed in most all respects to the mother. Hence, the project of going through the files selecting families that would be studied was begun.

It should be considered at the start that the presentation of this material does not lend itself well to publication. This is not too difficult to realize when one considers the impracticability of presenting the actual head films in superimposed positions that must be changed from skeletal part to skeletal part. However, it is hoped that through the media of tracing of head films evidence of hereditary influences in the development of the adult human face, or the predetermined facial pattern, will be shown.

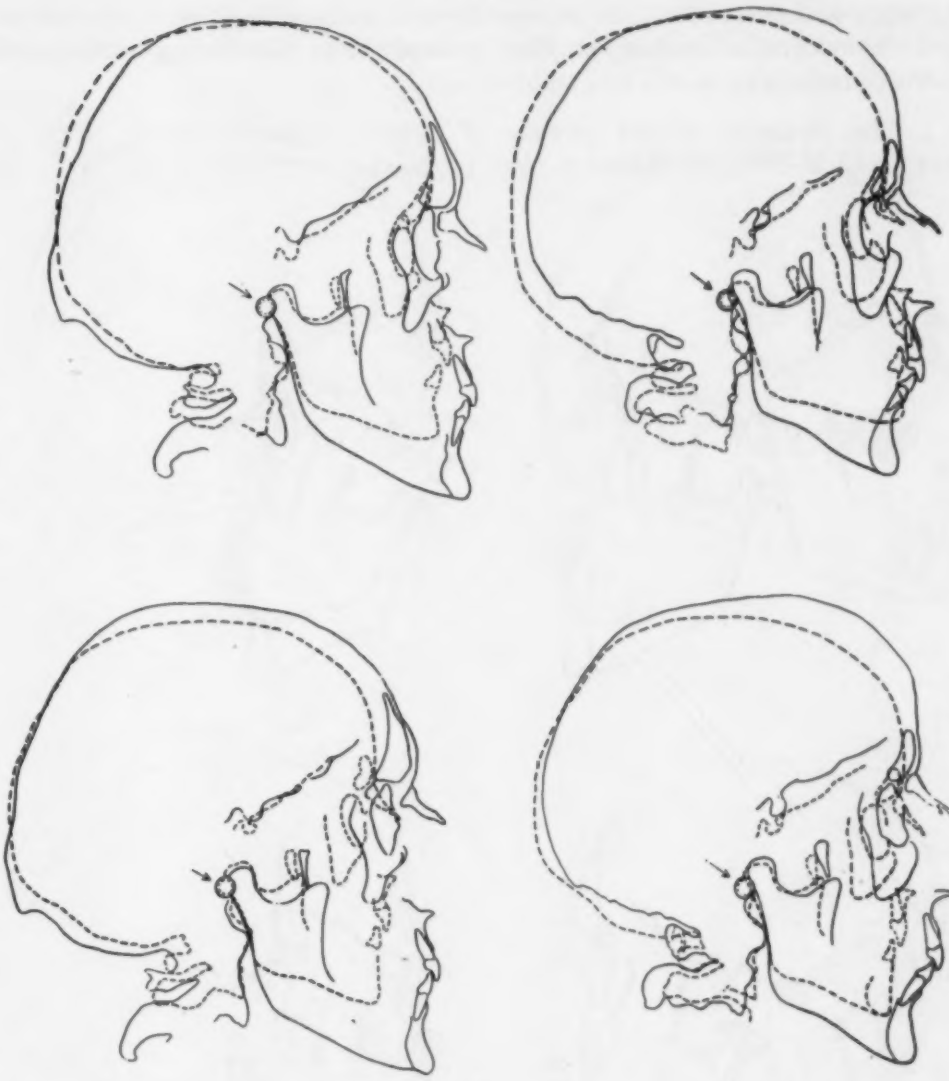
For the purpose of presentation, families herein presented were selected because of the marked difference of facial patterns between the father and mother. This was done so that the evidence I wish to present will be more obvious to the reader who does not have the availability of the actual head films.

In presenting the material, let us consider that we will discuss five families, which for the sake of description we will refer to as:

Family B. Two children. Boy and Girl. Twins.
Family C. Two children. Girls. Identical.
Family H. Two children. Boys. Age 12:5 and 10:10.
Family R. Two children. Boy and Girl. Twins.
Family S. Three children. Girls. Age 10, 7, 5.

Family B.—This family is of interest as the father is of direct Irish descent and the mother is of direct Italian descent. The father has an almost normal occlusion, whereas the mother has a typical Class II, Division 2 malocclusion with extreme crowding of the anterior teeth. Examination of the children discloses that Leland has a near normal occlusion and arch development for his age, whereas Kathleen has a Class II, Division 1 malocclusion with narrow arch development.

A.



B.

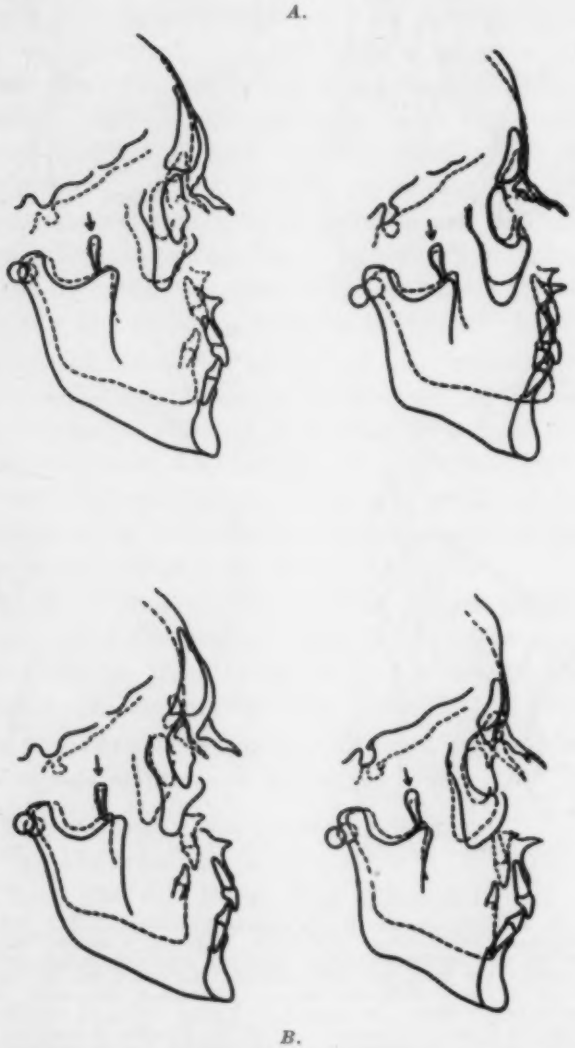
Fig. 1.—Family B. *A, Left,* ——, Dr. B., 34 years, 7 months; – – –, L. B., 6 years, 6 months; *right,* ——, Mrs. B., 34 years, 10 months; – – –, L. B., 6 years, 6 months. Twin, not indentical, superimposed with father and mother on the external auditory meatus. Note general conformity of the skull outline, the body of the mandible, the orbit, the zygomatic process of the maxilla, and the pterygoid fossa with the father. Contrast this with the lack of general conformity of parts with the mother.

B, Left, ——, Dr. B., 34 years, 7 months; – – –, K. B., 6 years, 6 months; *right,* ——, Mrs. B., 34 years, 10 months; – – –, K. B., 6 years, 6 months. Twin, not indentical, superimposed with father and mother on the external auditory meatus. Note lack of general conformity of the mandible, the zygomatic process of the maxilla, sella turcica, and nasion with the father. Compare the general similarity of the skull outline, sella turcica, the body of the mandible, nasion, and the orbit with the mother.

Examination of the head film tracings would indicate that Leland in virtually all respects conforms more closely to his father than to his mother. Kathleen on the other hand appears to conform to her mother.

Points of interest that are not easily seen without the availability of the actual cephalostatic head films that present more convincing evidence of hereditary influences on the two children are:

1. The posterior clinoid process of Leland conforms exactly with his father's and is distinctly different from his mother's.



A.

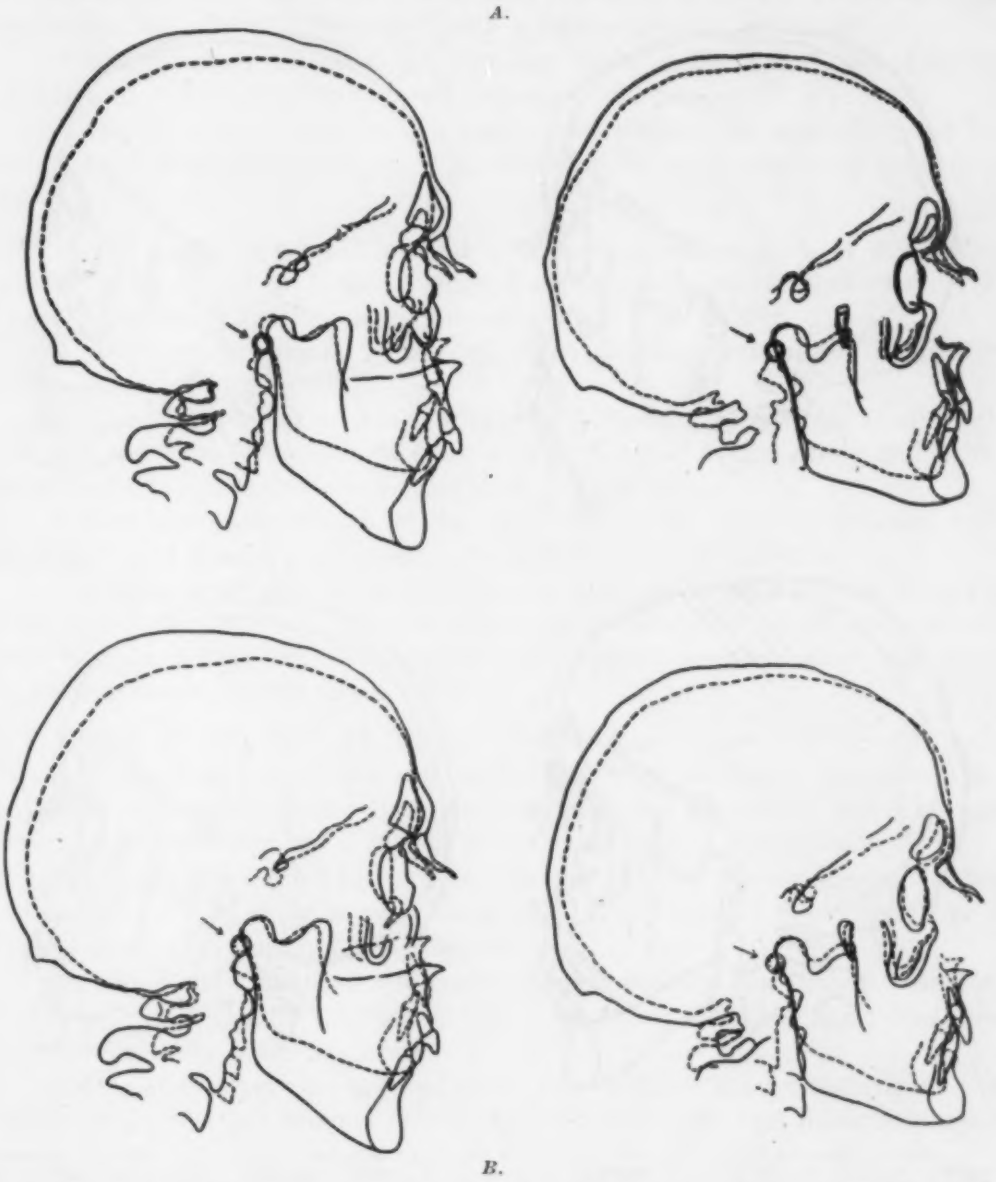
B.

Fig. 2.—Family B. *A, Left,* ——, Dr. B., 34 years, 7 months; ---, L. B., 6 years, 6 months; *right,* ——, Mrs. B., 34 years, 10 months; ---, L. B., 6 years, 6 months. L., superimposed with father and mother on the pterygoid fossa. Note that by changing the superposition point and eliminating the skull outline and the vertebrae, the relative similarity or dissimilarity of the faces may be seen. It is of interest to note that L.'s face in most every respect more closely conforms to the father's than to the mother's.

B, Left, ——, Dr. B., 34 years, 7 months; ---, K. B., 6 years, 6 months; *right,* ——, Mrs. B., 34 years, 10 months; ---, K. B., 6 years, 6 months, K., superimposed with father and mother on the pterygoid fossa. Note that by comparing the two tracings K. appears to conform to both father and mother. However, the similarity of arrangement of parts and the cant of the body of the mandible definitely conform to the mother.

2. The posterior clinoid process of Kathleen conforms in general shape and contour with her mother's, and is distinctly different from her father's.

3. The frontal sinus and the orbit of the father appear to be joined by an extension of the sinus. Leland conforms in this with his father, whereas Kathleen has a distinctly separate sinus and orbit similar to her mother.



A.

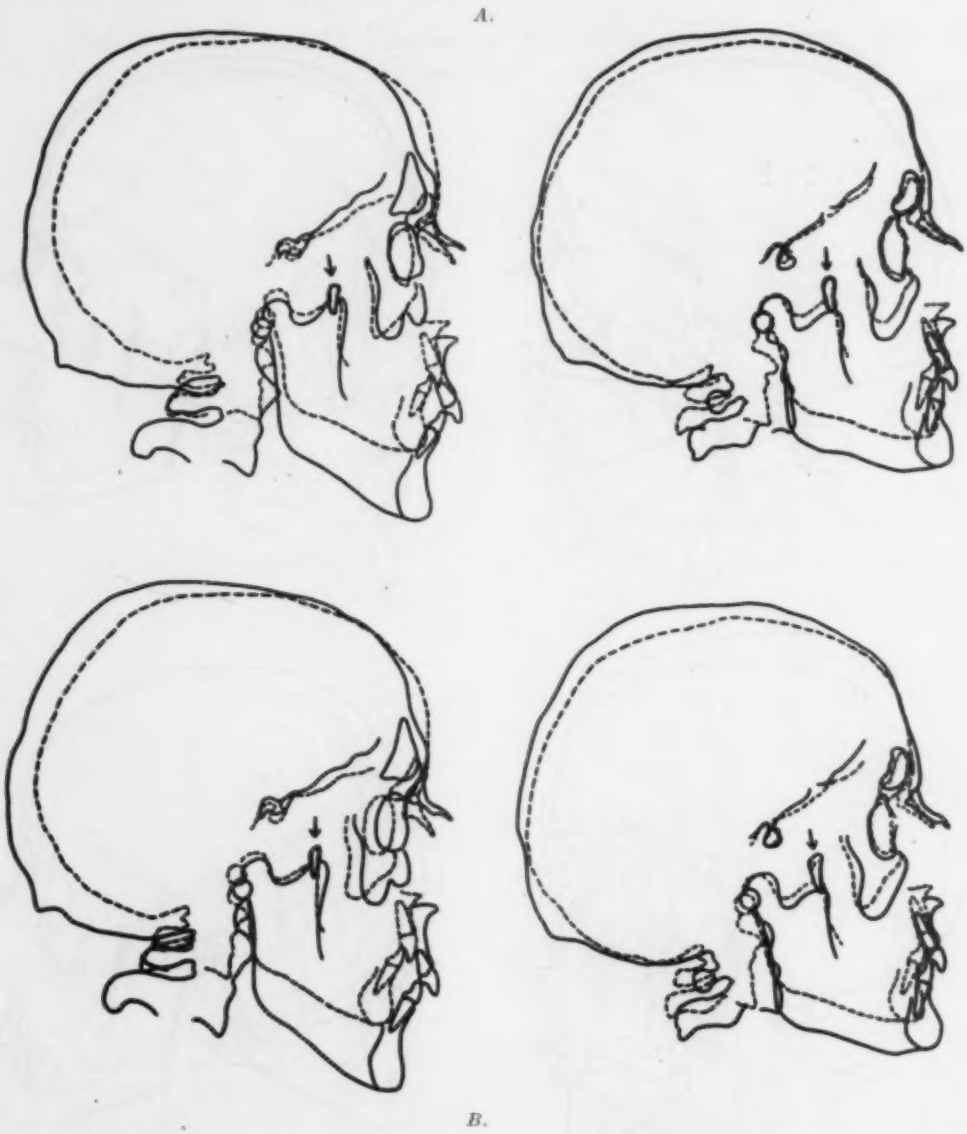
B.

Fig. 3.—Family C. *A, Left,* ——, Mr. C., 38 years, 10 months; – – –, S. C., 9 years, 2 months; *right,* ——, Mrs. C., 31 years, 7 months; – – –, S. C., 9 years, 2 months. Twin appears identical, superimposed with father and mother on the external auditory meatus. Note that this family group is of interest because it appears that both children conform very definitely to the mother. Note that S. conforms in virtually all parts to the mother and lacks any similarity to the father.

B, Left, ——, Mr. C., 38 years, 10 months; – – –, Sh. C., 9 years, 2 months; *right,* ——, Mrs. C., 31 years, 7 months; – – –, Sh. C., 9 years, 2 months. Twin appears identical, superimposed with father and mother on the external auditory meatus. Note the lack of general conformity of skull outline, the body of the mandible, and the frontal sinus with the father. Contrast this with the similarity of parts and the similarity of arrangement of parts with the mother.

4. The general shape and size of the skull outline of Kathleen conform closely to the mother, whereas Leland's skull outline is very dissimilar to his mother.

5. Superimposed tracings of Leland and Kathleen show that there is not a general conformity or similarity of anatomical parts.



A.

B.

Fig. 4.—Family C. *A, Left,* ——, Mr. C., 38 years, 10 months; ---, S. C., 9 years, 2 months; *right,* ——, Mrs. C., 31 years, 7 months; ---, S. C., 9 years, 2 months. S. superimposed with father and mother on the pterygoid fossa. Note that the cant of nasion conforms exactly with the mother. The body of the mandible conforms more closely with the mother. The contour of the frontal sinus is very similar to the mother. Note the dissimilarity of the first and second cervical vertebrae to the father.

B, Left, ——, Mr. C., 38 years, 10 months; ---, Sh. C., 9 years, 2 months; *right,* ——, Mrs. C., 31 years, 7 months; ---, Sh. C., 9 years, 2 months. Sh. superimposed with father and mother on the pterygoid fossa. Note that the skull outline is dissimilar to the father; note also the definite similarity of arrangement and parts to the mother. Of interest, but not presented here, is that the tracings of the twins when superimposed with each other are not identical, althought very similar in most parts.

Family C.—In this family, the mother is of pure Scotch descent, and the father is of French descent on the paternal side and English on the maternal side. The mother has rather well-developed arches with a mild Class II, Division 1 malocclusion. The father has a typical Class I, Division 2 malocclusion.

Examination of the children discloses that they both have almost identical malocclusions—Class I, Division 2 with a mild cross-bite, unilateral.

Examination of the head film tracings would indicate that both Suzanne and Sharon conform in virtually all respects to the mother.

Points of interest that are not easily seen without the availability of the actual head films, and yet provided additional evidence of hereditary influences, are:

1. The posterior clinoid process and the tuberculum sella of the father appear to be united by a bony bridge, thereby closing the sella turcica. This is not evident in either Sharon or Suzanne.
2. The posterior clinoid process of the mother conforms almost identically with Sharon or Suzanne.
3. The father appears to have a very large frontal sinus and a small orbit, whereas the mother appears to have a more normal frontal sinus and orbit. Suzanne and Sharon conform closely with the mother.
4. The zygomatic process of the mother conforms almost identically with Suzanne's and Sharon's, whereas the father's is definitely different.
5. The superimposed tracing of the two girls would indicate that they are very near being identical; however, there are minor points of difference as the cant of the mandible and the placement of the frontal sinus and slight difference in the zygomatic process of the maxilla.

Family H.—In this family, the hereditary influences are very definite. It may be because the mother and father have such distinctly different facial patterns. The mother has well-developed arches, and apparently had a normal occlusion. The father has a typical Class II, Division 1 malocclusion.

Examination of the two boys reveals that Robert has an almost normal occlusion with a slightly excessive overbite. David on the other hand has a typical Class II, Division 1 malocclusion.

Examination of the head film tracings would indicate that Robert conforms in virtually all respects with his mother. David on the other hand conforms almost identically with his father.

Points of interest that are not easily seen without the availability of the actual head films that provide convincing evidence of the hereditary influences are:

1. The general shape and contour of sella turcica of David conforms almost exactly with his father's, whereas it does not conform with his mother's.
2. The pterygoid fossa of David conforms exactly with his father's, and the pterygoid fossa of Robert conforms almost exactly with his mother's; they are not interchangeable.

3. The skull outline of Robert conforms almost exactly with his mother's. The skull outline of David is definitely similar to his father's, and definitely different from his mother's.

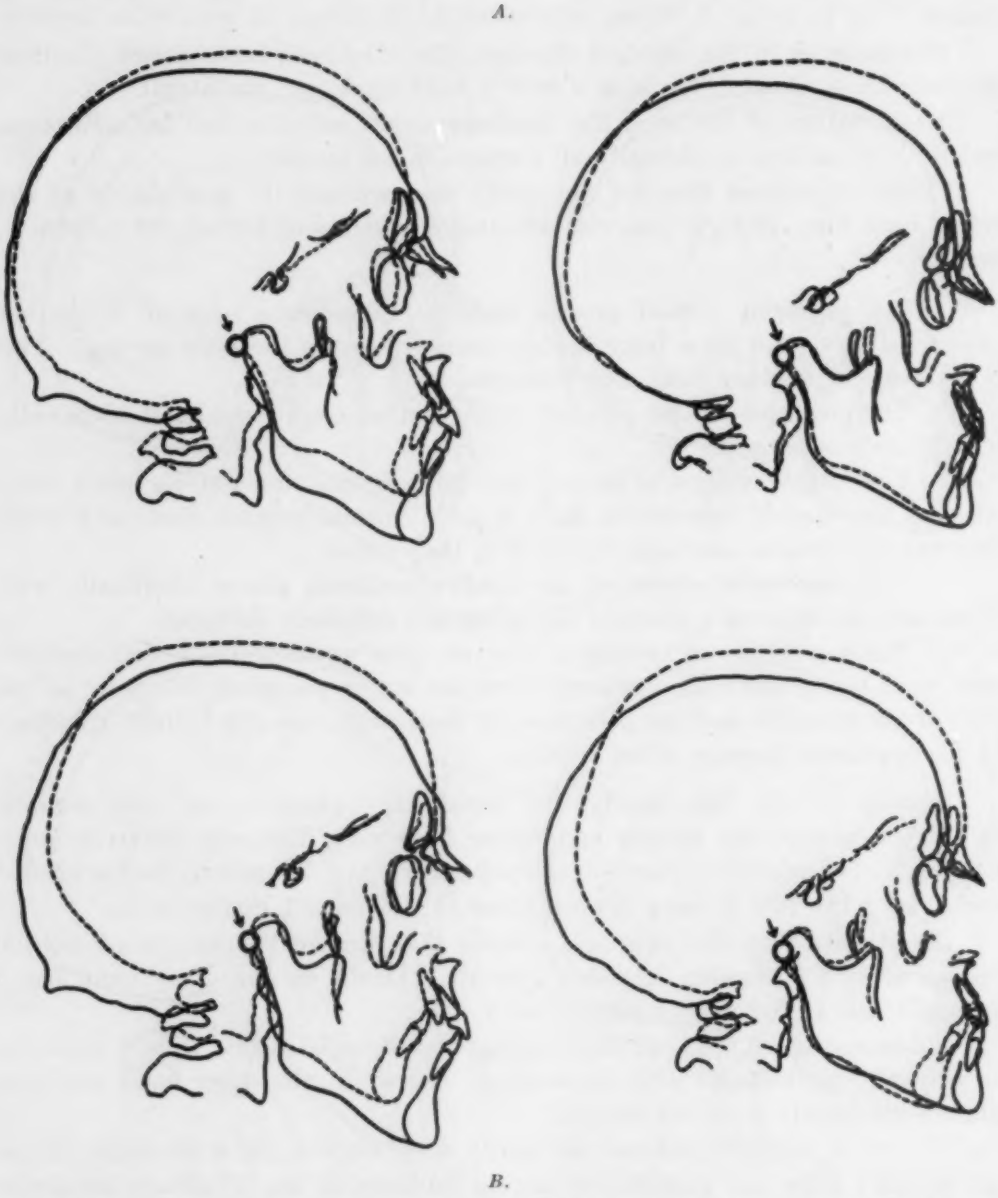
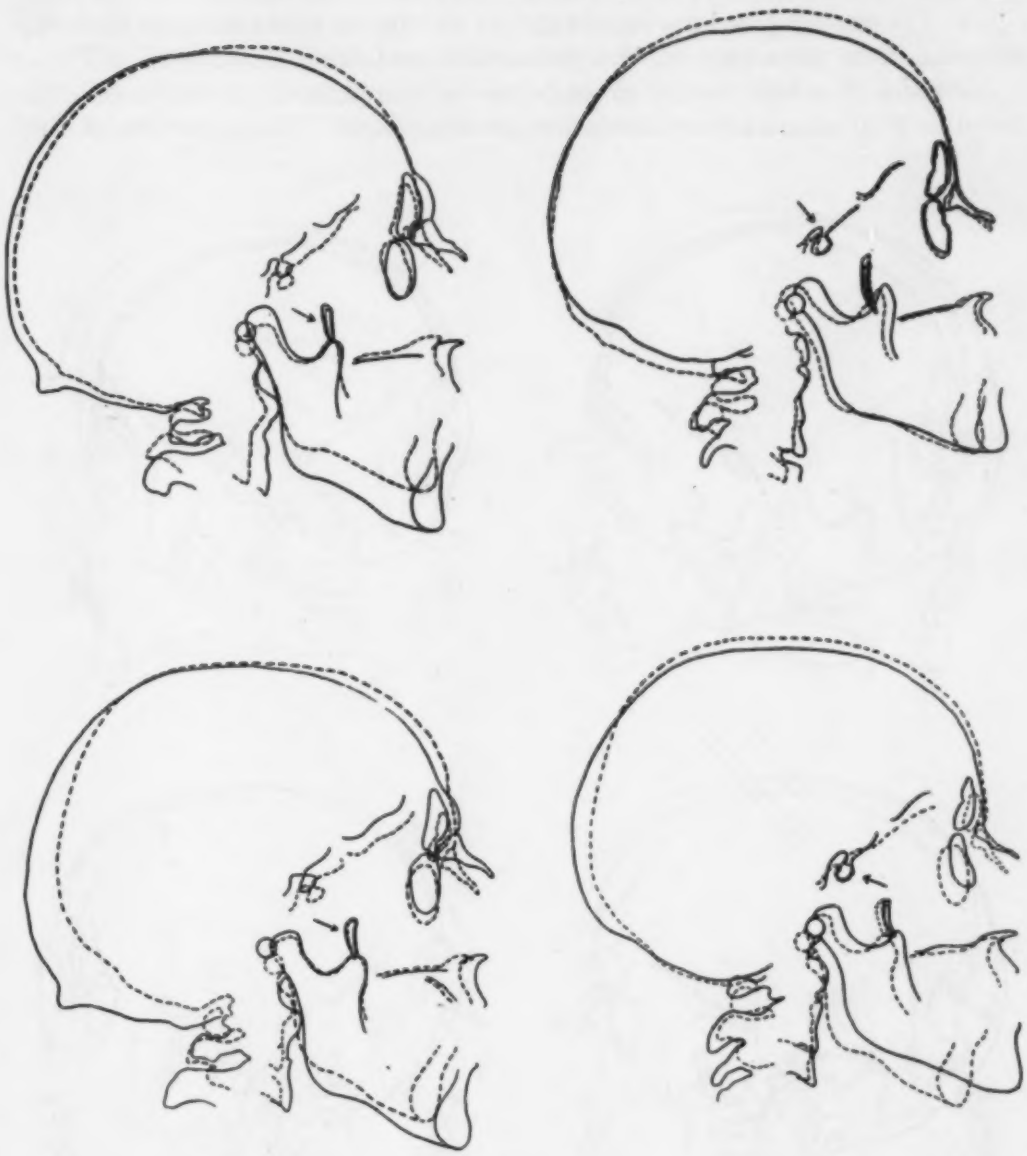


Fig. 5.—Family H. *A, Left,* ——, Mr. H., 40 years, 10 months; – – –, R. H., 12 years, 5 months; *right,* ——, Mrs. H., 39 years, 7 months; – – –, R. H., 12 years, 5 months. R. superimposed with father and mother on the external auditory meatus. Note the lack of conformity of arrangement of parts with the father and the similarity of arrangement with the mother. Comparing the outline of the body of the mandible it will be noted that R. conforms almost exactly with the mother, and is very dissimilar to the father.

B, Left, ——, Mr. H., 40 years, 10 months; – – –, D. H., 10 years, 10 months; *right,* ——, Mrs. H., 39 years, 7 months; – – –, D. H., 10 years, 10 months. D., superimposed with father and mother on the external auditory meatus. Note that although the skull outline is not similar to the father, the general arrangement and similarity of parts do conform to the father. Comparing to the mother note that although D. does appear similar in many respects, the body of the mandible does not conform with the mother.

A.



B.

Fig. 6.—Family H. *A, Left,* ——, Mr. H., 40 years, 10 months; – – –, R. H., 12 years, 5 months; *right,* ——, Mrs. H., 39 years, 7 months; – – –, R. H., 12 years, 5 months. R., superimposed with father on the pterygoid fossa and the mother on sella turcica. Note that by changing the superposition point it is more evident that R.'s facial pattern and similarity of parts conform very closely to the mother. In these tracings the teeth were eliminated so that the bony structures could be compared more easily.

B, Left, ——, Mr. H., 40 years, 10 months; – – –, D. H., 10 years, 10 months; *right,* ——, Mrs. H., 39 years, 7 months; – – –, D. H., 10 years, 10 months. D., superimposed with the father on the pterygoid fossa and the mother on sella turcica. Note that by changing the superposition it is evident that D. conforms in virtually all respects to the father. Considering the younger age of D., it is conceivable that with growth and development his facial pattern will become increasingly dissimilar to the mother and very similar to the father.

4. The mandible of David is almost identical to his father's; but slightly smaller. The mandible of Robert is very similar to his mother's.

5. The superimposed tracings of Robert and David would indicate distinctly different facial patterns, and with few similar anatomical structures.

Family R.—This family presents one of the difficult cases wherein the hereditary influences are not easily seen or determined. The deductions of any-

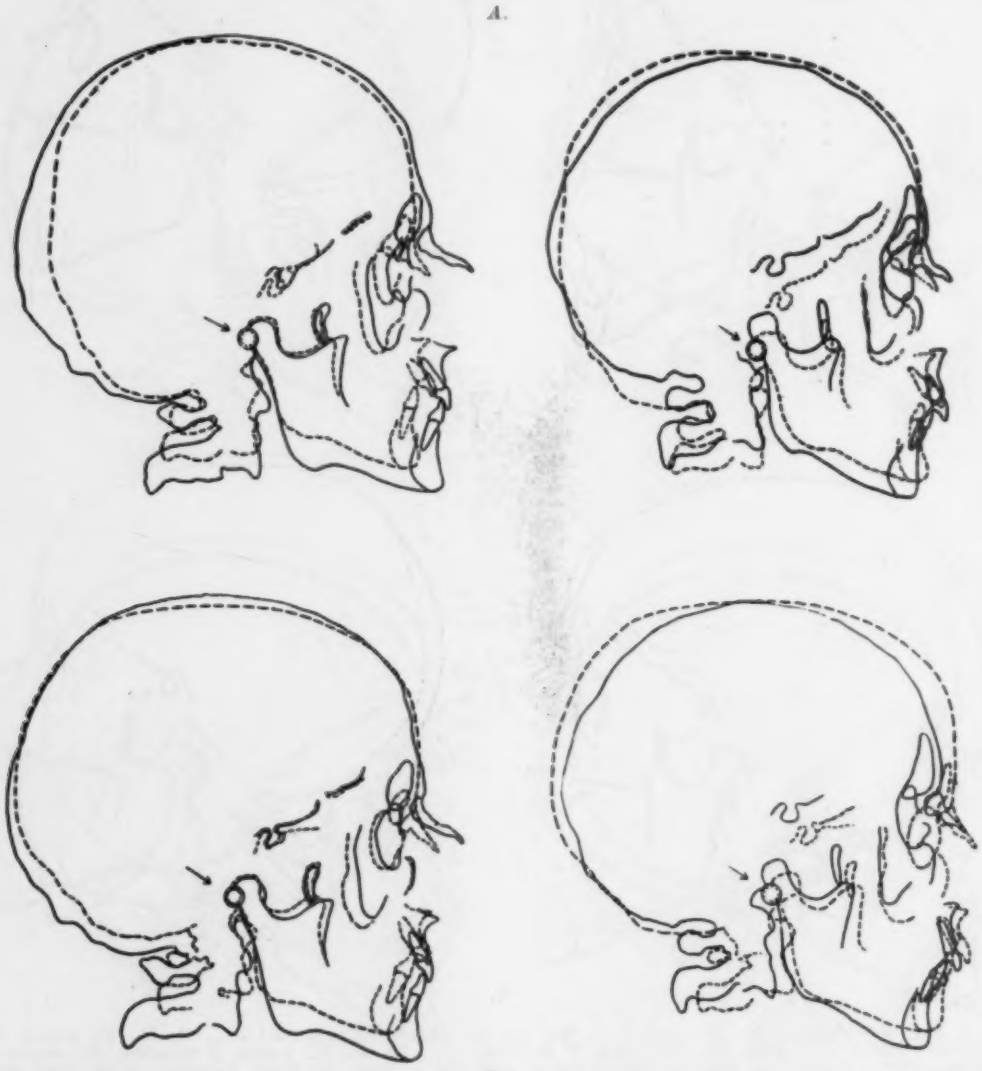
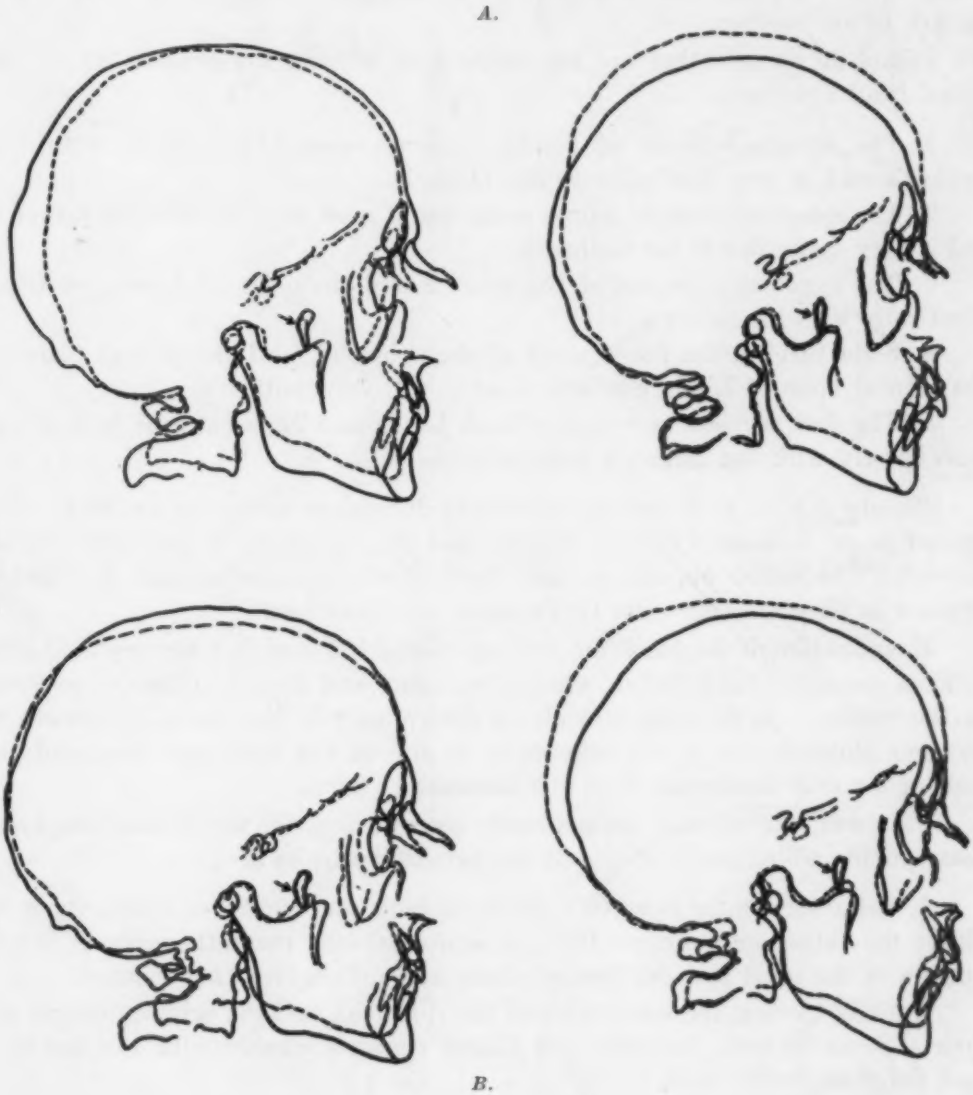


Fig. 7.—Family R. *A, Left,* ——, Mr. R., 37 years, 2 months; ---, J. R., 8 years, 10 months; *right,* ——, Mrs. R., 34 years, 11 months; ---, J. R., 8 years, 10 months. Twin, not identical, superimposed with the father and mother on the external auditory meatus. Note general conformity of arrangement and similarity of parts with the father, and lack of conformity with the mother. In virtually all respects J. appears to be his father at a similar age. Compare the similarity of the cervical vertebrae with the father and the dissimilarity with the mother.

B, Left, ——, Mr. R., 37 years, 2 months; ---, L. R., 8 years, 10 months; *right,* ——, Mrs. R., 34 years, 11 months; ---, L. R., 8 years, 10 months. Twin, not identical, superimposed with the father and mother on the external auditory meatus. Note the dissimilarity of the mandible, the cervical vertebrae, nasion, and the zygomatic process of the maxilla. Although there appears to be a similarity of L. to the father, especially in the skull outline, the face appears more closely to parallel the mother. Note particularly the close similarity of the first and second cervical vertebrae.

one on this family could always be subject to question, because there is no distinct paralleling of the children to one or the other parent. Instead, there appears to be a composite conformity of certain parts to both parents.

The father is of Irish-English descent and the mother is of Scotch-Irish descent. The father appears to have had a Class II, Division 1 malocclusion, and the mother has a Class II, Division 1 malocclusion.



A.

B.

Fig. 8.—Family R. *A, Left,* ——, Mr. R., 37 years, 2 months; ---, J. R., 8 years, 10 months; *right,* ——, Mrs. R., 34 years, 11 months; ---, J. R., 8 years, 10 months. J. superimposed with the father and mother on the pterygoid fossa. Note that in changing the superposition point it would appear that J. conforms in every respect except the mandible to the father. This family would tend to show that we have a composite facial pattern in the children, J. having very similar conformity with the father except for the mandible. Now compare L.

B, Left, ——, Mr. R., 37 years, 2 months; ---, L. R., 8 years, 10 months; *right,* ——, Mrs. R., 34 years, 11 months; ---, L. R., 8 years, 10 months. L. superimposed with the father and mother on the pterygoid fossa. Note that in changing the superposition L. appears to conform to the skull outline of the father, but appears to have a dissimilar mandible. Comparing to mother, she appears to be very similar in virtually every respect except the skull outline. Not shown here, but of interest, is that superimposing L. and J. in the two positions shows that they are similar in some respects but do not conform.

Examination of the head film tracings would tend to show that James conforms in most respects to his father, and appears to be dissimilar to his mother. Linda appears to conform to her mother's facial pattern; however, her skull ouline is definitely dissimilar. When the tracings were superimposed on the pterygoid fossa, James appears to conform to his father in all respects except the mandible, and that seems to conform more closely to his mother's; Linda appears to have the skull outline of her father, and the general facial pattern of her mother.

Points of interest that are not easily seen without the availability of the actual head films are:

1. The sphenoid sinus of Linda conforms almost identically with her mother's and is very dissimilar to her father's.
2. The sphenoid sinus of James conforms in most respects with his father's, and is very dissimilar to his mother's.
3. The zygomatic process of the maxilla and the orbit of James conforms identically with his father's.
4. Sella turcica, the lesser wing of the sphenoid, and the orbital plate of the frontal bone of Linda conform exactly with her mother's.
5. The first cervical vertebrae of both Linda and James appear to conform more closely with the mother's than with the father's.

Family S.—In this family, hereditary influences are more evident. The mother is of Russian-Austrian descent and the father is of probable Jewish descent. The father appears to have fairly normal occlusion, and the mother appears to have a slight Class II, Division 1 malocclusion.

Examination of the head film tracings would indicate that Beverly conforms in most respects to her father, whereas Suzanne and Elaine appear to conform to the mother. It is more difficult to determine the hereditary influences in younger children due to the differences in size of the head and face, and the lack of general development of the anatomical parts.

Points of interest that are not easily seen without the actual head films and that provide additional evidence of the hereditary traits are:

1. Sella turcica in Beverly appears to lack conformity of similarity with either the father or mother. Beverly conforms with the father closely in the outline of the orbit and the frontal sinus, and differs from her mother.
2. Sella turcica, the lesser wing of the sphenoid, and the orbital plate of the frontal bone in both Suzanne and Elaine conform closely with the mother's and differ markedly from the father's.

Fig. 9.—Family S. *A, Left,* ——, Mr. S., 43 years; ———, B. S., 10 years; *right,* ——, Mrs. S., 39 years; ———, B. S., 10 years. B. superimposed with the father and mother on sella turcica. Note that there is a general conformity of arrangement and similarity of parts with the father. Contrast this with the marked dissimilarity with the mother.

B, Left, ——, Mr. S., 43 years; ———, S. S., 7 years; *right,* ——, Mrs. S., 39 years; ———, S. S., 7 years. S. superimposed with the father and mother on sella turcica. Note that there is a definite lack of general conformity and similarity of parts with the father and a marked similarity with the mother.

C, Left, ——, Mr. S., 43 years; ———, E. S., 5 years; *right,* ——, Mrs. S., 39 years; ———, E. S., 5 years. E. superimposed with the father and mother on sella turcica. Note that even at such an early age it is apparent that E. is conforming to the facial pattern of the mother.

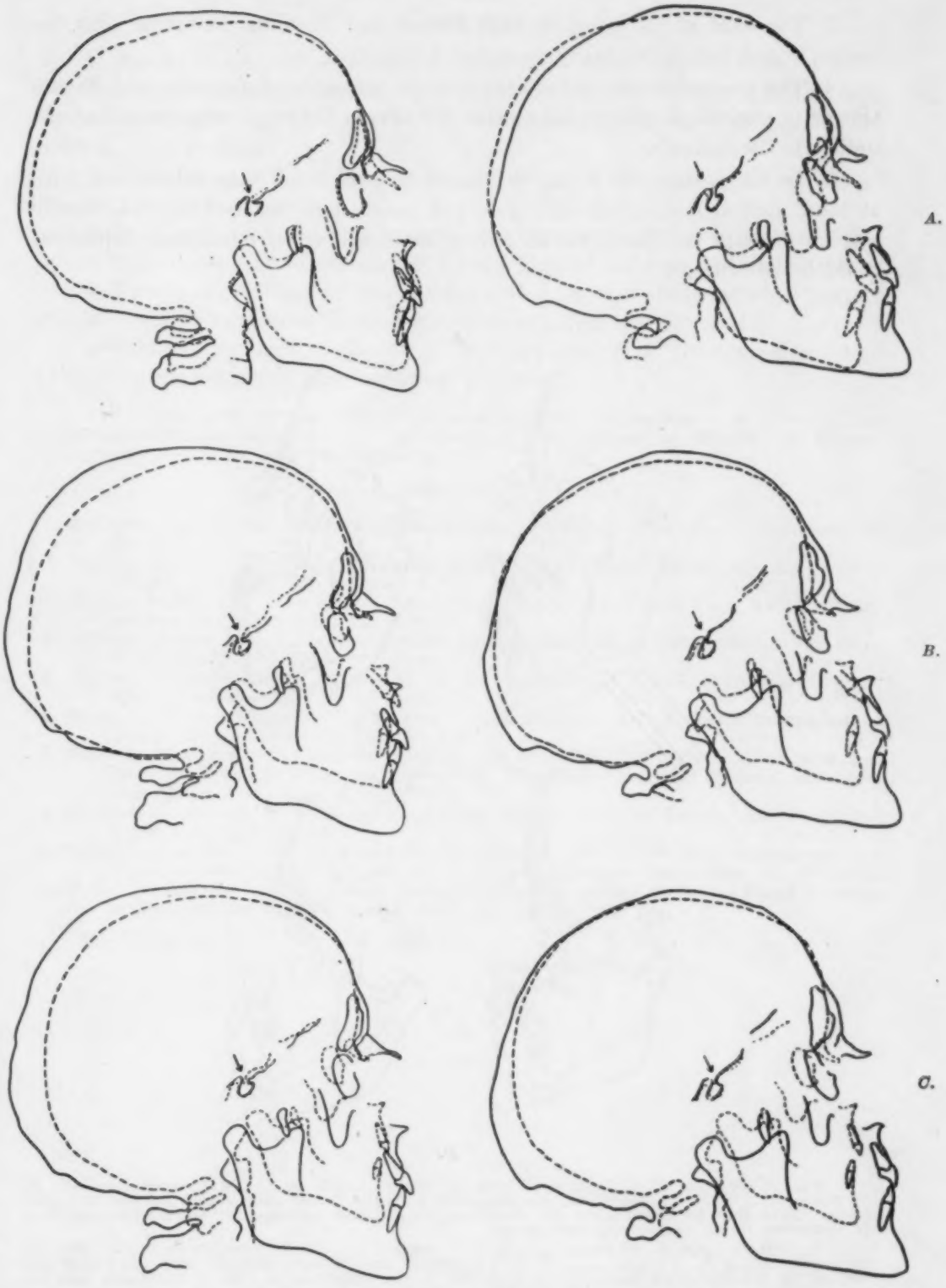


Fig. 9.—*A*, *B*, and *C*. (*For legend, see opposite page.*)

3. The cant of the orbit in both Elaine and Suzanne conforms with the mother's and differs markedly from the father's.

4. The general shape and contour of the mandible of Suzanne and Elaine appear to conform closely to the mother's, whereas Beverly's appears to be very similar to the father's.

5. In comparing this family it should be considered that subsequent films at later ages should validate or rule out conclusions reached, as this family was an attempt to determine an approximate age when hereditary influences could be determined.

Fig. 10.—Family S. *A, Left,* ——, Mr. S., 43 years; – – –, B. S., 10 years; *right,* ——, Mrs. S., 39 years; – – –, B. S., 10 years. B., superimposed with the father and mother on the pterygoid fossa. Note that by eliminating the skull outline and the vertebrae it is more evident that B. conforms in all respects to the father.

B, Left, ——, Mr. S., 43 years; – – –, S. S., 7 years; – . –, E. S., 5 years; *right,* ——, Mrs. S., 39 years; – – –, S. S., 7 years; – . –, E. S., 5 years. S. and E. superimposed with the father and mother on the pterygoid fossa. Note that due to the difference in size of the heads and the marked similarity of E. to S., her tracing was first superimposed with S.'s and these in turn were superimposed with the father's and mother's. Examination of the plates will reveal that both the girls are following the mother's facial pattern.

SUMMARY

1. Roentgenographic cephalostatic head films would appear to be of value for the determination of hereditary influences in the development of the face. They have unquestionable value in the determination of resemblances of children to their parents.

2. Superimposed head films would appear to have value in any study of human inheritance.

3. It appears to be possible to predetermine the adult face in most children by the superimposition of cephalostatic head films of children and their parents.

4. Future head films of the children used in this study as they mature should confirm or disprove the deductions made in this paper.

5. Predetermination of the adult face appears to be the "missing link" in orthodontic diagnosis and treatment planning.

The author acknowledges with sincere appreciation the assistance in collecting the roentgenographic materials and the photograph of the tracings by Mr. M. E. Quirolo, Radiography, 450 Sutter St., San Francisco.

REFERENCES

1. Atkinson, Spencer R.: Changing Dynamics of the Growing Face, AM. J. ORTHODONTICS 35: 836, 1949.
2. Bayley, Nancy: Tables for Predicting Adult Height From Skeletal Age and Present Height, J. Pediat. 28: 49-64, 1946.
3. Hooton, Earnest A.: The Evolution and Devolution of the Human Face, AM. J. ORTHODONTICS AND ORAL SURG. 32: 657-672, 1946.
4. Hooton, Earnest A.: Anthropometry and Orthodontics, AM. J. ORTHODONTICS AND ORAL SURG. 32: 673-681, 1946.
5. Hughes, Byron O.: The Growth of Children—Psychological and Hereditary Factors, AM. J. ORTHODONTICS 35: 16-24, 1949.
6. Krogman, Wilton Marion: The Role of Growth Analysis in Orthodontic Interpretation, AM. J. ORTHODONTICS 34: 708-713, 1948.
7. Pancoast, Henry K., Pendergrass, Eugene, and Schaeffer, J. Parsons: The Head and Neck in Roentgen Diagnosis, Springfield, Ill., 1940, Charles C Thomas, Publisher, chap. 1, pp. 7-90; chap. 9, pp. 773-904.
8. Snodgrasse, Richard M.: Family Line Study in Cephalofacial Growth, AM. J. ORTHODONTICS 34: 714-724, 1948.
9. Tarasido, Rodolfo: The Face and Its Development. Anomalies of Occlusion and the Trend to Beautify the Features, AM. J. ORTHODONTICS AND ORAL SURG. 32: 627, 1946.
10. Wylie, Wendell L.: A Quantitative Method for the Comparison of Cranio-Facial Patterns in Different Individuals, Am. J. Anat. 74: 39-60, 1944.

450 SUTTER ST.

THE INCREASED GONIAL ANGLE IN MICROGNATHISM

LEONARD R. RUBIN, M.D., NEW YORK, N. Y.

THIS article is primarily concerned with the cosmetic implication of those individuals who suffer from a moderate degree of micrognathism. The deformity in these patients is not sufficiently severe to require resection of the mandible but can be successfully corrected by use of an onlay of either cartilage, bone, or polyethylene. Corrective surgery together with orthodontics can vary the facial contour sufficiently to convert a rather homely individual to one conforming to our standards of beauty. Unfortunately, the problem is not as simple as it may at first appear. Certain basic factors have now become apparent in practice.

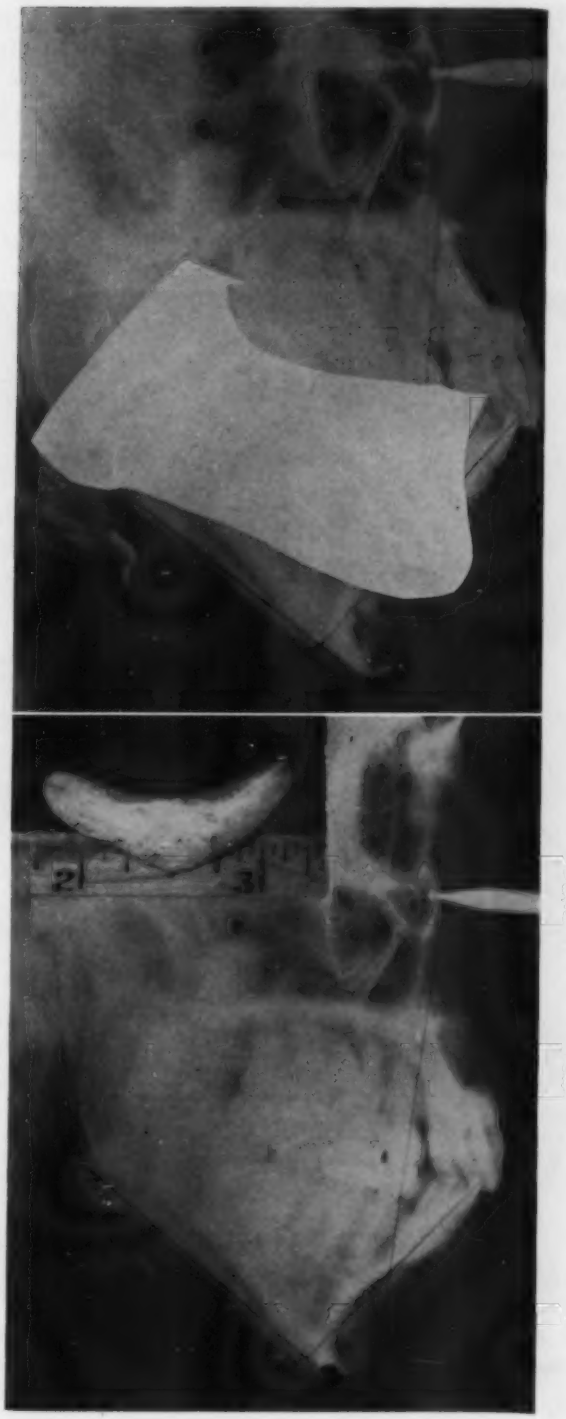
Evaluating cosmetic results obtained with onlays, using cartilage, bone, and polyethylene, we noticed one consistently untoward result. Far too many of our patients showed postoperatively that they had acceptable profiles but presented the impression of possessing a heavy, long lower jaw, almost a "lantern jaw." Our operative practice in those cases was to place onlays over the anterior portion of the mandible, making sure the inferior margin of the implant came down to the lower border of the mandible. We were trying to get a smooth, continuous contour to blend the margins of the onlay and the mandible. Why then the heavy jaw? Apparently the trouble was not with the onlay but rather with the increased superior-inferior length of the body of the mandible. Was there then a correlation between this excessive length and the micrognathism?

We started our studies with normal mandibles. Information was readily available from a group of men in orthodontics. It was of interest that the greatest advances in the study of facial bony relations had come from this group. Starting with the work of such men as Broadbent and Salzmann, we had a method of analyzing the growth patterns in facial structure and were able to obtain some important statistics pertaining to our problem.

The normal adult mandible has an angle ranging from 115 degrees to 125 degrees between its two components, the ramus and the body. This is known as the gonial angle. Using the Broadbent cephalometric x-ray technique, we reviewed the x-ray findings of our micrognathic patients. It became apparent that this angle was much greater than 125 degrees, ranging more often around 150 degrees. The body of the mandible was tilted downward and backward, and presented an oblique anterior surface with a resultant greater superior-inferior length. As the plane of the body of the mandible became steeper because of the greater angle, the length of the anterior presenting portions became greater.

From the Plastic and Maxillofacial Services, Meadowbrook Hospital, Hempstead, N. Y., and Nassau Hospital, Mineola, N. Y.

A.

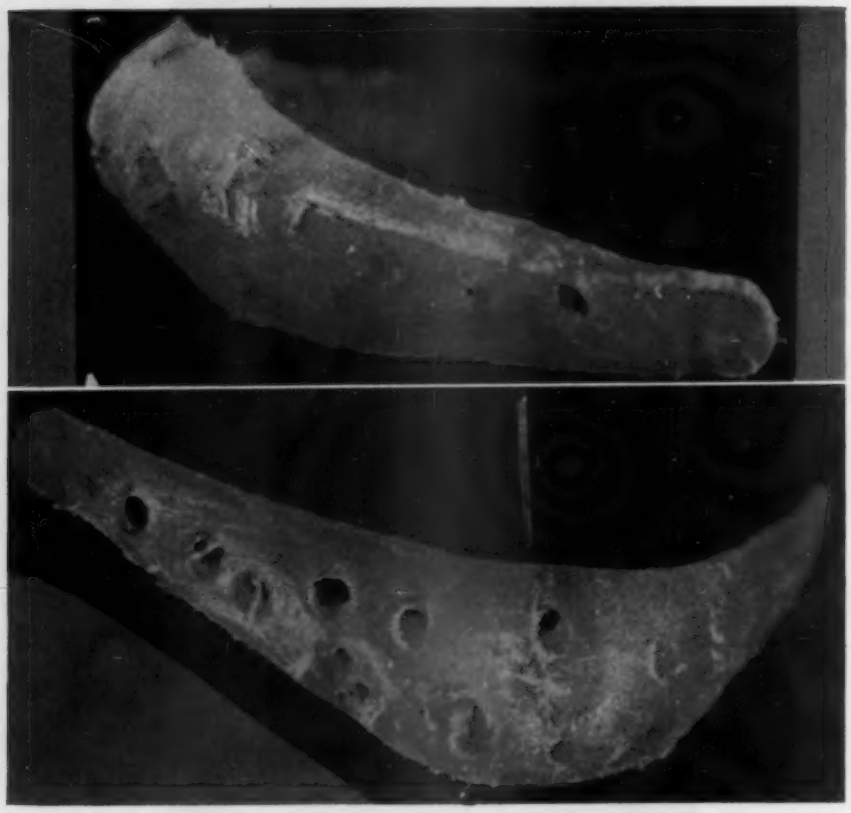


B.

Fig. 1.—*A*, The importance of the gonial angle is illustrated by the superimposed paper rotated at the gonial angle to 123 degrees instead of the 140 degrees shown in the photograph. Note how there is a diminution in superior-inferior length of the chin and also note how the micrognathism is minimized as the body of the mandible juts forward. *B*, A cephalometric x-ray showing the increased gonial angle of about 140 degrees (X). The lines show the angle. The dark portion at the inferior border of the mandible is a cross section of bone removed. The insert shows the actual bone removed against an inch ruler.

With an explanation of the mandibular excessive superior-inferior length, we had an answer to our problems. We could cut off the inferior border of the mandible. This would reduce the effect of a heavy jaw. The amount to be removed was dependent upon the esthetic viewpoint of the operator. We present a full case as an example, showing the x-rays, bone removed, and the onlay used.

A.



B.

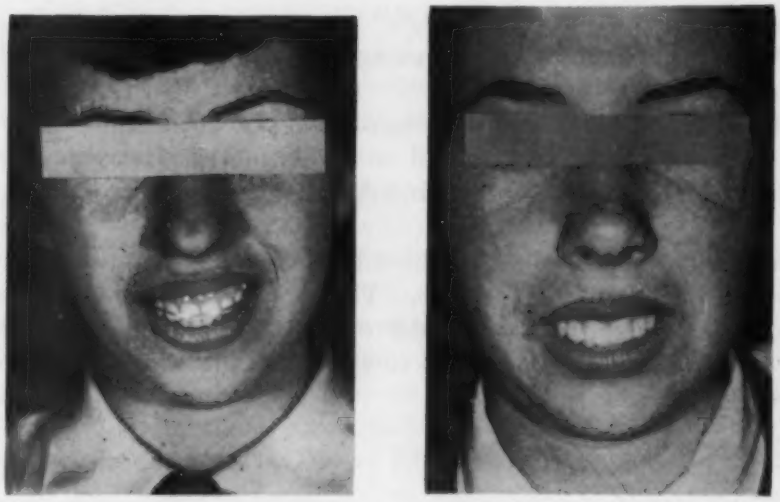
Fig. 2.—*A* and *B*, Two views of a polyethylene implant. Note roughness and through-and through holes which are made to aid in fibrous fixation.

For the past four years, I have presented a new plastic material, known as polyethylene, for reconstructive surgery. After having worked with cartilage, homologous and autogenous, solidly shaped pieces and diced, we found we could not obtain a critical cosmetic end result. Homologous cartilage was difficult to shape and eventually became absorbed. Autogenous cartilage meant operations on the chest wall and then the difficulty in obtaining careful shaping. We had the same criticism in iliac bone.

Contrariwise, polyethylene made for easy surgery. It could be shaped before the operation, and, except for some very minor changes, could be slipped into position as soon as the mandible was exposed. Since x-rays were taken

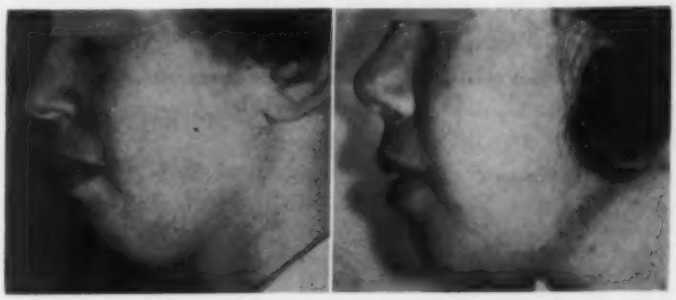
before each operation, an estimation of the amount of the inferior border of the mandible to be removed could be determined beforehand.

With the use of polyethylene the corrective operation was a very simple procedure. An incision was made through the skin posterior to the submental fold. The incision was carried down and anteriorly to the inferior border of the mandible. The periosteum at the inferior border was incised and then lifted off the anterior surface of the body. One gloved finger was inserted in the mouth at the lower sulcus to make sure the mouth was not broken into. It was important to make sure this glove was changed before



A. *B.*

Fig. 3.—*A* and *B*, Pre- and postoperative photographs showing full-face view of patient.



A. *B.*

Fig. 4.—*A* and *B*, Pre- and postoperative photographs showing chin change and rhinoplasty. The patient is still undergoing orthodontic treatment.

re-entering the chin wound. Even with penicillin the chances of infection might cause trouble. In one case this neglect was followed by drainage for a few days of a purulent serous exuate which was controlled by penicillin washes locally.

The posterior periosteum of the body was then lifted sufficiently to allow removal of the desired amount of bone. A small handsaw is ideal for cutting the inferior portion of the mandible. By making holes in the polyethylene implant, fixation to the mandible is assured when fibrous tissue grows through from the skin to the bone. Wiring the onlay to the bone makes certain a firm union.

It is interesting that in twenty cases of micrognathism performed, no polyethylene implant has had to be removed for the four and one-half years we have used the plastic.

A case is presented to illustrate the facts discussed in the article.

SUMMARY

1. The normal mandible has an angle of about 125 degrees between the ramus and the body.

2. Many cases of moderate micrognathism show this angle to be increased as much as 150 degrees. Associated with this increase is a constant esthetic deformity of an excessive superior-inferior length giving the appearance of a "lantern jaw."

3. Surgical removal of the inferior border of the mandible shortened the superior-inferior length of the face. The amount removed was determined beforehand by taking x-rays with the Broadbent technique.

4. Polyethylene implant onlays to the mandible simplified the operation and gave critical end results.

11 East 68th St.

Dr. John Mershon, one of the well-known and pioneer orthodontists of the world, passed away on Wednesday evening, Feb. 18, 1953.

Reports

REPORT OF THE NOMENCLATURE COMMITTEE, AMERICAN ASSOCIATION OF ORTHODONTISTS, 1952

FOR a number of years the Nomenclature Committee of the American Association of Orthodontists had dutifully presented its annual report. Sometimes these reports were long and contained specific recommendations; sometimes they were shorter but no less serious in nature but all had one thing in common—they were respectfully submitted, accepted, and apparently promptly forgotten. All of our best efforts seem to have gotten us nowhere. These remarks are not meant as any form of criticism, but, as far as the future efforts of the Orthodontic Nomenclature Committee are concerned, they make us pause and inquire whether we are pursuing our objective in the proper manner. Perhaps one of the reasons for this frustrating experience lies in the simple fact that the defining of words, terms, and concepts constitutes a problem of vast complexity and that it is impractical and unwise to delegate the total responsibility in this field to a small committee composed of men who have had little or no experience in lexicography.

Furthermore, any proposals the Nomenclature Committee may make regarding their opinions as to the preference of particular words and terms related to orthodontics are not likely to be taken seriously, even when the proposed words and terms are approved by the Association.

If orthodontic nomenclature is to be substantially improved recommendations will have to come from more authoritative sources, and then emphasis placed upon their adoption by dental educators throughout the country, perhaps through the medium of the American Association of Dental Schools. Thus, over a long period of time no doubt considerable progress could be made.

Your Committee, after careful consideration, has unanimously agreed that perhaps the best way in which the Orthodontic Nomenclature Committee can fulfill a useful purpose in our Society would be to act as a sort of liaison committee working with the Bureau of Library and Indexing Committee of the American Dental Association which is presently employing Dr. George Denton to conduct a rather extensive survey in the over-all problem of dental nomenclature. This coming June in Chicago the American Dental Association will hold a conference on dental nomenclature, and an outline of the scope of its endeavors follows.

The American Dental Association, through its Bureau of Library and Indexing Service, will hold at the Central Office in June, 1952 (probable dates 20-21), *a two-day conference on dental nomenclature* for members of nomenclature committees of dental organizations and other interested persons indicating a desire to attend.

In order to assure the accomplishment of definite results from this meeting, the work of the conference will be limited to a consideration of *concepts pertaining to occlusion.*

This subject has been chosen because it touches the basic thinking of such specialties as orthodontics, prosthodontics, periodontics, oral surgery, pedodontics, and restorative dentistry, as well as comparative anatomy and anthropology.

Presented at the meeting of the American Association of Orthodontists, St. Louis, Mo., April, 1952.

A study of the results accomplished by attempts to improve the nomenclature of dentistry shows that most of the difficulties arise as much from lack of agreement and understanding of the basic concepts of the science as from the problems of appropriate designation of these concepts by adequate terminology. It has been decided, therefore, at this A.D.A. nomenclature conference to attempt to select and define the essential concepts pertaining to occlusion without, for the present, being too much concerned with the terms which have been employed to designate these concepts.

It is hoped that agreement may be largely achieved and that the viewpoints of the various specialties may be harmonized. If this aim is accomplished appreciably among the conferees at this meeting, the conference will be considered a successful step to further progress in the attainment of a rational and useful nomenclature.

Later circulars will attempt to clarify the aims and work of the conference so that those in attendance may be oriented to the problems to be considered, before the conference opens.

The program of the conference will consist of several prepared papers dealing with different aspects of the subject and of comments by assigned discussers and open discussion by members of the conference. A summary of the proceedings of the conference, with definitions of the concepts discussed, will be prepared and distributed to all participants.

The program will be directed and the meeting conducted by Dr. George B. Denton, Research Consultant in charge of the Association's nomenclature project.

Inquiries may be directed to Dr. Donald A. Washburn, Director of the Bureau of Library and Indexing Service, and General Chairman of the Conference on Dental Nomenclature, 222 East Superior Street, Chicago 11, Illinois.

Preliminary Expression of Interest

I am interested in the conference on dental nomenclature planned by the A.D.A. and should like to receive the circulars which from time to time will be issued to explain its purpose and study method.

Dr._____

Address_____

_____

Please mail to Dr. Donald Washburn, 222 East Superior Street, Chicago 11, Illinois.

AMERICAN DENTAL ASSOCIATION

Conference on Dental Nomenclature

Circular No. 2—Feb. 1, 1952

The purpose of this second circular is to indicate the scope, aims, and general methods of the A.D.A. conference on Concepts Pertaining to Occlusion.

Scope of the Concept Occlusion

At the conference it is planned to interpret the general concept of occlusion in its broadest signification. It will therefore be understood to cover all phenomena relative to closure and opening of the jaws. These phenomena will include mastication, speech, deglutition, and some non-functional activities of the stomatognathic system. For purposes of description, these activities will be analyzed into structural relations, physiologic movements, critical positions of anatomic structures in motion, as well as the applications of muscular force in amount and direction.

Occlusion in the Various Branches of Dental Science

All the various branches of dental science are concerned with aspects of occlusion. Some of the concepts of occlusion developed in one field vary from analogous concepts in other fields; and even within the same department of dentistry there are divergences which need to be reconciled.

Some of the concepts pertaining to occlusion are of especial interest to one specialty. At the conference it is planned to group related concepts for discussion and to refer them to the departments of dental science with which they have become most associated. An assigned essayist in each of five dental branches will discuss the concepts of occlusion pertinent to his field. In orthodontics will be considered the general concept of occlusion, static and dynamic, the ontogenetic development of occlusion, and the types of occlusion manifested in mastication, speech, and deglutition. In prosthodontics, the essayist will present *centric occlusion* and the concepts related to edentulousness. In periodontics, the concept of so-

called *traumatic occlusion* will be considered. In oral surgery will be considered the relations of the temporomandibular joint to occlusion and particularly the concept of *overclosure*. Perspective will be supplied by the fields of comparative dental anatomy and anthropology. In this department will be discussed the phylogenetic development of occlusion and such concepts of occlusion as *prehension* which have greater significance in other organisms than in man.

Inclusion and Exclusion of Concepts

The concepts considered at the conference will be restricted to conditions and phenomena of occlusion in health and disease. In general only concepts indicative of a type of occlusion, normal or abnormal, will be included. In practice, other concepts regarding etiology, outcome, diagnosis, and treatment of these types of occlusion have been employed. But all these aspects of occlusion dealing either with the causes which have brought about a type of occlusion, or with their results, or with the means of ascertaining them, or with the measures for securing their continuance or correction—all these concepts will be excluded.

Thus, *traumatic occlusion* will be discussed, but *periodontal traumatism* will be excluded. Such diagnostic concepts as *registration* and *taking the bite*, and such corrective measures as *equilibration, selective grinding*, and *bite raising* will be omitted from consideration. At the same time, such concepts as *denture height, denture space*, and *balancing occlusion* fall legitimately within the scope of this conference.

Methods of Definition to Be Employed

The aim of the conference is to define and evaluate the concepts of occlusion considered. It is desirable to determine exactly what every concept involves and implies and to examine critically its application and usefulness.

Since the first purpose is to fix the meaning of the concept, any and all methods of definition that prove helpful to this end may be employed. Ways of clarifying concepts are here suggested:

1. Formal definition, though seldom adequate, is helpful in establishing the boundaries of the concept at the beginning of the discussion. In so-called logical definition the meaning is circumscribed by referring the concept to a general class (the genus), and then particularizing it by assigning to it a distinguishing character (the differentia) which excludes all analogous concepts. Thus *mastication* might be logically defined as *the activity of the stomatognathic system* (the class) *in comminuting food* (the differentia).

2. Negative definition consists in indicating what is not contained within the meaning of the concept.

3. Comparison and discrimination of the definitions of a concept given by several authors bring out the various possible implications and interpretations.

4. A study of the historical, or semantic, development of the concept over a period of years is particularly helpful, showing changes which have taken place in the concept with the advent of new information and new thought.

5. Whereas logical definition attempts merely to place the boundaries of the concept and to make its identification certain, extended definition, consisting of explanation and analysis, endeavors to fill in the detailed content of the concept.

6. Examples of the applications of concepts may aid in bringing out the meanings.

7. Critical examination of the various statements defining the concept will raise questions as to the consistency, extent, validity, and usefulness of the concept, and help in answering them.

Examples of the use of these methods of definition will appear in the discussions in subsequent circulars regarding the conference.

Subsequent Circulars

Subsequent circulars will deal with problems arising in connection with general concepts of occlusion, with centric and other concepts of prosthodontics, with traumatic occlusion, and with overclosure and the temporomandibular joint relations.

In circular No. 3, the subjects of the prepared papers to be given at the conference will be announced with the names of the essayists and assigned discussers.

Suggestions and inquiries with regard to the work of the conference will be welcomed.

Correspondence with regard to the conference should be addressed to Dr. Donald Washburn, 222 East Superior Street, Chicago 11, Illinois.

Your Nomenclature Committee suggests that the incoming president of the American Association of Orthodontists delegate a representative from the Committee on Nomenclature to attend this conference which, incidentally, will devote its original thoughts to "Concepts of Occlusion," certainly a most important subject to our particular specialty.

We respectfully submit this report and sincerely hope that the incoming Committee will find it possible to report more substantial progress in the future.

Respectfully submitted,

WALDO URBAN,
GEORGE M. ANDERSON,
KYRLE W. PREIS, Chairman,
Nomenclature Committee.

REPORT TO THE AMERICAN ASSOCIATION OF ORTHODONTISTS BY THE AMERICAN BOARD OF ORTHODONTICS, 1952

AT ITS 1952 meeting, just concluded, the Board processed (in all categories) one hundred seventy-five persons. There were twenty-one new applications accepted. Sixty-four persons were granted another year to fulfill their requirements. Two persons were requested to repeat part of their examination. Four were requested to repeat the entire examination. Seven applications were canceled for nonfulfillment of requirements. Sixty persons were certified, thus making a grand total of four hundred fourteen diplomates.

Due to the requirement, under our working agreement with the Council on Dental Education of the American Dental Association, of either two years of graduate or postgraduate study or two years of preceptorship, we could not accept several applications received since the 1951 meeting of the Board. We shall try to avoid working a hardship on a few men who have just completed their necessary five years of exclusive practice and have been unable for one reason or another to obtain either the necessary graduate or postgraduate course or the preceptorship. Some of these are veterans, who, of course, should receive special consideration. The Council gives us some leeway on interpretation of requirements. We feel that we can take care of this situation and have formulated several alternative methods by means of which these men can fulfill their requirements. As an example, under certain conditions and under certain definite rules a man may serve a preceptorship under a member of the American Association of Orthodontists while carrying on his own practice in his own office. This type of preceptorship is designated as a supervisory preceptorship. Anyone interested in pursuing study of this type with the objective of preparing himself for application to the Board should contact the Director of the Board located in his vicinity. We trust that the membership will be patient during this difficult period of adjustment.

Presented at the meeting of the American Association of Orthodontists, St. Louis, Mo., April, 1952.

Department of Orthodontic Abstracts and Reviews

Edited by

DR. J. A. SALZMANN, NEW YORK CITY

All communications concerning further information about abstracted material and the acceptance of articles or books for consideration in this department should be addressed to Dr. J. A. Salzmann, 654 Madison Avenue, New York City

Abstracts Presented Before the Research Section of the American Association of Orthodontists, April 23, 1951

A Study of Sutural Facial Growth by Means of Metallic Implants in the Macaca Rhesus Monkey: By Benjamin J. Gans and Bernard G. Sarnat, University of Illinois College of Dentistry, Department of Oral and Maxillofacial Surgery, Chicago, Ill.

The contribution to the growth of the face of the frontomaxillary, frontozygomatic, zygomaticomaxillary, zygomaticotemporal, and premaxillomaxillary sutures was studied in eight Macaca rhesus monkeys. The method employed was that of surgically exposing the suture and, after drilling a cavity, inserting amalgam in each of the adjacent bones. The distance between forty such paired implants was measured. At the end of the experimental period (seven to ten months), the animals were sacrificed and the skulls dissected. Measurements were again made of the distance between the implants on each side of the suture. The amount of separation of the paired implants for a given period was thus determined. The findings revealed that in a seven-month period the increase in the distance between the implants was greatest at the zygomaticotemporal suture (1.7 to 3.3 mm.) and less so at the zygomaticomaxillary suture (1.0 to 1.4 mm.). The amount of separation between the implants of the frontomaxillary, frontozygomatic, and premaxillomaxillary sutures was so little that it could not be accurately measured. The implants which originally were on the lateral surface of the zygomatic arch and the lateral surface of the lateral wall of the orbit were seen, at the completion of the study, on the medial side. This study demonstrates: (1) bone growth occurs at sutures, (2) rate of bone growth is greatest at the zygomaticotemporal and zygomaticomaxillary sutures of those studied, (3) appositional growth at the site of the implants was greatest on the lateral surface of the zygomatic arch and the lateral surface of the lateral wall of the orbit.

Prevalence of Malocclusion in Children Aged 14 to 18 Years: By Maury Massler, D.D.S., M.S., and John M. Frankel, D.D.S., M.S., University of Illinois.

The etiology and treatment of malocclusions have often been studied by clinicians; the epidemiologic aspects of the problem, only seldom. A simple quantitative method of assessing malocclusion for epidemiologic purposes is suggested. The method is based on the simple thesis of counting the number of malocclused teeth in each individual. This study was undertaken to test the usefulness of this method and to accumulate epidemiologic data on the prevalence of malocclusion in a group of 2,758 children 14 to 18 years of age.

It was found that:

1. Almost 80 per cent of the children had malocclusions of the teeth which required correction. Only 3 per cent had "ideal" occlusion, while 18 per cent had less than 10 very mildly malposed teeth which did not require orthodontic correction ("normal" occlusion).

2. The arithmetical mean for the group was 10.5 malocclueded teeth per child with, however, a very large standard deviation (±10). Almost the same number of children showed from zero to 20 malocclueded teeth.

3. There was no striking difference between boys and girls in the number of malocclueded teeth.

4. The number of persons with malocclusion and number of malocclueded teeth did not change appreciably from the fourteenth to the eighteenth year.

5. The lower incisors were the most frequently malocclueded and the upper first molars the least often affected teeth in the arches.

6. Bilateral symmetry in the number of malocclueded teeth was very frequent. Teeth in the lower jaw were more frequently malocclueded than teeth in the upper jaw.

7. The distribution of malocclusions according to Angle's classification was consistent with other studies.

1. **The Postnatal Growth of the Mandible in Macaca Mulatta. A Metric, Roentgenographic, and Histologic Study:** By Louis J. Baume, D.M.D., M.S., Division of Dental Medicine, College of Dentistry, George Williams Hooper Foundation for Medical Research, University of California, San Francisco, Calif.

The postnatal development of the lower jaw was studied biometrically and roentgenographically in 41 Rhesus monkeys representing consecutive dental developmental stages during the period between the fully formed deciduous dentition and the permanent dentition. Twenty were selected for histologic study in three different planes. Metric, roentgenographic, and histologic data lead to the following conclusions: Growth of the mandible during all the periods studied occurred on every surface. There was considerable forward growth at the anterior surface of the mandibular body; osteogenic activity at its lower border contributed a quarter of the gain in mandibular body height. This indicates that both sites are not qualified to serve as fixed planes in the roentgenographic superposing technique. Relatively stable regions due to osteogenic aplasia were found at the mandibular canal below the second premolar. Histologically the alveolar process of the permanent dentition was entirely a new formation built during the eruption of each permanent tooth and for the main part at the expense of the former mandibular body. The development was characterized by a small amount (2.9 mm. average) of vertical alveolar growth in the premolar region and even none in the anterior region. While the mandible increased 12.1 mm. in over-all length the intercondylar dimension widened 6.5 mm. This, together with histologic evidence of extensive sites of resorption at the inside of the ramus and lamellar apposition at its outside and particularly at the posterior border, indicated a growth movement of the mandible in both lateral and predominantly posterior directions, thus producing continuously an enlarged replica of its preceding model. Histologic sections clearly demonstrated that the functions of intramembranous bone formation, resorption, and apposition at the sites of muscle insertions were performed by the mesenchymal cells of the perimysia in place of a distinct periosteum. At the site of the insertion of the internal pterygoid muscle, for instance, innumerable osteoclasts, interlaid between the tendinous fibers, revealed the directly connected Sharpey's fibers while the perimysial cells of the masseter insertion produced an osteoblastic activity. This indicated an osteogenic property of muscle tissue itself rather than of function. Contrary to newer contentions it was observed that bone can grow intramembranously in a diametrically opposite direction to muscular stresses. There was backward growth of the posterior border, for

instance, against the obliquely upward and forward stresses of the masseter and pterygoid muscles. The endochondral growth center at the condylar head proved to be the leader and organizer of the entire mandibular growth although a relatively small increase in ramus height (4.7 mm.) was typical for Macaca. Chondrogenesis proceeded in a posterolateral direction with a very low vertical component. In opposition to some assertations a small increase in ramal as well as dental height was not interceptive to a uniform maintenance of an end-to-end occlusion in the transient deciduous and permanent dentitions.

2. **The Postnatal Growth of the Upper Jaw in Macaca Mulatta. A Comparative Metric, Roentgenographic, and Histologic Study**: By Louis J. Baume, D.M.D., M.S., Division of Dental Medicine, College of Dentistry, George Williams Hooper Foundation for Medical Research, University of California, San Francisco 22, Calif.

The upper jaws of 41 Macaque monkeys were subjected to biometric and roentgenographic evaluation. Twenty of these were studied histologically. The growth of the upper jaw was characterized by the coordinated activity of sutural and periosteal osteogenesis. The main center of longitudinal development was situated at the maxillary tuberosity and the premaxilla. Both periosteal and sutural ossification at these zones contributed equally to the increase in length of the upper jaw. An identical mechanism at the facial surface and median palatal suture was instrumental in the growth in width. Vertical development was brought about by a combined mechanism of sutural and periosteal bone formation at the orbits and the palate, respectively, but only to a small extent at the free alveolar surfaces and cribriform plates. No specific preponderance was evidenced in the contribution of the sutures or the periosteum to facial bone growth. The developmental processes (apposition and resorption) at the various surfaces seemed to be governed by the specific growth pattern of the neighboring organ (eye, tongue, masticatory muscles), rather than a local autonomy of the osseous growth site itself. The diagrammatic conception of the rigidity of the developmental pattern was refuted by findings of the following changes in facial proportion:

a. The decreasing profile angle was due to greater forward growth of the alveolar portion in relation to the orbitonasal portion of the upper jaw (or the relative stability of the orbits).

b. The increase in nasal height was concomitant with the decrease in anterior alveolar height due to resorption of the labial plate after replacement of the incisors. This was associated with an altered angulation of the permanent incisors in comparison to their predecessors and a changed course of the alveolar plane in relation to the floor of the nose.

c. There was an over-all increase in all portions of the maxillary bone in contrast to the stability of the pyramidal process of the palatine bone and of the pterygoid process of the sphenoid bone.

Factual evidence thus favors the concept that an ontogenetic change of facial proportions controls the development of the face.

3. **Histologic Investigation Into the Relationship Between Jaw Growth, Tooth Development, and Tooth Eruption**: By Louis J. Baume, D.M.D., M.S., Division of Dental Medicine, College of Dentistry, and the George Williams Hooper Foundation for Medical Research, University of California, San Francisco, Calif.

Histologic study of entire jaws of 20 Rhesus monkeys in three planes at different developmental stages of the dentition disclosed the following

relationship between jaw growth and tooth development: The bone structures behaved passively and reactively. The "passivism" was expressed by the uniformity of bone resorption at the inside of the crypts during the expansional growth of the permanent tooth germs. This also initiated early root resorption at the lingual surface of the deciduous teeth. Continuous osteoclasia at the fundus of the germs did not confirm the assertion that the position of the Hertwig's sheath remains fixed during tooth development. Reactive bone formation due to odontogenesis was evidenced by the following phenomena: (a) the pre-eruptive movements of the germ induced lamellar apposition in certain areas of the crypts; (b) the spacing of the anterior predecessors was associated with the formation of a transitory bony septum between the already eroded lingual root surface of the predecessor and its succeeding tooth germ; (c) the development of a lingual mandibular bulk was concomitant with the pre-eruptive movement of accessional molar buds and produced the lingual plate of the future alveolar process of accessional mandibular teeth; (d) the mesial migration of the teeth in function which was distinct in the mandibular arch was instigated by a reactive growth movement of the neighboring alveolar portion to the development of an accessional molar germ.

The complicated path of the mandibular molar buds demonstrated the inadequacy of the present concepts of the mechanism of eruption. The pre-eruptive movements of a lower permanent molar comprised a lingual drifting and rotation and a distal downward tilt; the active vertical eruption consisted in a ¾ downward movement combined only in the next to last phase with an upward movement of the crown. It was terminated by a downward growth of the roots into the mandibular body. The first stage of the clinical eruption of the anterior teeth was characterized by abundant trabecular bone formation around the apex. This framework, however, was reabsorbed during the final root formation as soon as the crown had reached the plane of occlusion.

The study of the developmental stages of the mandibular permanent central incisor revealed a differential growth activity of alternating portions of the cervical loop of the dental organ. This seemed to be responsible for a correlative (pre-eruptive) movement of the entire germ and the modeling osteogenic processes at the inner surface of the crypt. At the cessation of amelogenesis the outer enamel epithelium and the epithelium in the gubernaculum which necessarily connected each tooth bud with the oral mucosa was seen to show proliferation. These observations suggest the application of the laws of experimental embryology (Harrison and Spemann) to the interpretation of the eruption process. The dental organ is thought to act as "organizer" of the connective tissue environment, its epithelium being provided with an "organogenic" as well as "topogenic" faculty.

The properly rated activity of the follicular epithelium therefore appears to be a primary factor in the establishment of normal position and occlusion of the teeth.

News and Notes

American Association of Orthodontists

When the American Association of Orthodontists meets in Dallas, Texas, April 26 to 30, 1953, the Baker Hotel will be the headquarters hotel. Dallas has complete facilities to make it one of America's leading convention cities—more than 130 hotels, large and small, and 90 tourist courts, with total guest capacity of around 25,000; diversified entertainment and recreation; thousands of square feet of exhibit space; and wholehearted hospitality on the part of the citizenship. Dallas' eight largest downtown hotels, including the Hotel Adolphus and the Baker Hotel (Fig. 1), have a total of more than 3,500 rooms alone. Hundreds of independent oil operators, many of them with interests in all the major Mid-Continent fields, make their headquarters in Dallas. The city is also headquarters for drilling contractors, lease and royalty brokers, and allied interests.

Outline of Essay Program

Spencer R. Atkinson, Pasadena, Calif. Early Treatment.

Ernest N. Bach, Toledo, Ohio. Incidence of Caries in Orthodontic Patients.

Dr. Henry Beyron, Stockholm, Sweden. Aging Changes in Adult Dentition and the Preservation of Supporting Tissues.

Elena Boder, M.D., Los Angeles, Calif. Facial Asymmetry in the Newborn Infant; Its Etiology and Orthodontic Significance.

Gerard J. Casey (A.D.A.), Chicago, Ill. Orthodontic Education.

S. Fastlicht, Mexico City, Mexico. Treatment of Impacted Cuspids.

T. M. Graber, Chicago, Ill. An Up-to-the-moment Review of the Clinical Adaptation of Cephalometry as a Diagnostic Aid.

L. B. Higley, Iowa City, Iowa. Rational Approaches in Orthodontic Diagnosis.

A. F. Jackson, Philadelphia, Pa. The Nature and Place of Removable Appliances in Orthodontic Treatment.

Allen H. Suggett, Santa Barbara, Calif. The Correction of a Mandibular Macrognathia by Surgical Means by Resecting the Ascending Ramii Just Below the Joints, the Operation Being Done From the Outside. A Study of Pioneer Operation Performed in 1930, and Predicated Upon Careful Gnathostatic Diagnosis and Orthodontic Preparation.

Paper prepared under direction of Robert E. Moyers, Toronto. Intraoral Factors Affecting Case Assessment.

Walter J. Pelton (U.S.P.H.S.), Washington, D. C. Orthodontics From the Public Health Viewpoint.

H. C. Pollock, St. Louis, Mo. Orthodontic Trends.

J. A. Salzmann, New York, N. Y. General Growth Acceleration and Retardation in Relation to Dentofacial Development.

Arnold E. Stoller, Seattle, Wash. The Normal Position of the Maxillary First Molar

John R. Thompson, Chicago, Ill. Normal and Abnormal Function of the Temporomandibular Joints.

Clifford L. Whitman, Hackensack, N. J. Habits Have Gotten to Be a Habit With Me. Prize Essay. Speaker to be announced later.

Symposium. Five case reports by members using different types of appliances and technique in the treatment of a typical distoclusion case.

Appliance	*Speaker*
Edgewise	F. F. Schudy, Houston, Tex.
Universal	Don C. MacEwan, Seattle, Wash.
Labiolingual	William H. Oliver, Nashville, Tenn.
Removable	S. D. Gore, New Orleans, La.
Twin arch	Earl E. Shepard, St. Louis, Mo.

A session for the presentation of abstracts of research studies will be held during the next meeting of the American Association of Orthodontists to be held at the Baker Hotel in Dallas, Texas, on April 26 to 30, 1953.

The titles, authors' names, and applications, should be submitted to Dr. John R. Thompson, 311 East Chicago Ave., Chicago, Ill., before March 15, 1953, in order to be included in the official program.

The National Railways of Mexico General Agency, 2401 Transit Tower, San Antonio 5, Texas, has arranged an all-expense post-convention tour for members of the American Association of Orthodontists and their families who care to visit Mexico City following the 1953 convention.

The tour will leave Dallas in special cars immediately after the convention, bound for Mexico City and a visit to interesting places in Mexico.

For further information please address: Mr. F. Alatorre, National Railways of Mexico, 2401 Transit Tower, San Antonio 5, Texas.

Entertainment Reservations for the Meeting

ALL SOCIAL AFFAIRS STRICTLY INFORMAL			NUMBER	COST
	Sunday, April 26			
6.30 P.M.	Cocktails and Buffet	$6.00		
	Monday			
12:30 P.M.	Golden Anniversary Luncheon	$4.00		
6:30 P.M.	Stag Dinner—Cocktails and Dinner	$7.50		
6:30 P.M.	Ladies' Cocktails and Dinner	$6.00		
	Tuesday			
12:30 P.M.	International Luncheon	$4.00		
12:30 P.M.	Ladies' Luncheon and Fashion Show	$4.00		
	Wednesday			
10:00 A.M.	Tour of Dallas	$2.00		
6:30 P.M.	President's Cocktail Party and Dinner Dance	$8.50		
	Enclose check for total cost		$	

Only signed reservation sheets will be honored. Preference will be given according to *postmark* date.

Send check made payable to Dr. Frank Roark, 4150 Mockingbird Lane, Dallas 5, Texas.

Please print signature _____

Address _____

Member of A.A.O. Section _____

Associate member _____

Guest of A.A.O. Section _____

Please fill in, tear out, and mail immediately.

Entertainment for the Ladies (A. B. Conly, chairman)

HOSTESSES

Mrs. Brooks Bell
Mrs. James W. Ford
Mrs. Clare K. Madden
Mrs. Franklin A. Squires
Mrs. Bibb Ballard
Mrs. A. B. Conly
Mrs. W. Harrell Delafield
Mrs. Joe Favors
Mrs. Robert E. Gaylord
Mrs. G. A. McJimsey
Mrs. Julius Tomlin
Mrs. Tom M. Williams
Mrs. Horace E. Wood

All social affairs strictly informal.

Sunday

6:30 to 8:00 — Cocktails and Buffet, Peacock Terrace of the Baker Hotel. (Informal.)
Tickets, $6.00 per person.

Monday

Adolphus Hotel

6:30 — Cocktails, Danish Room.
7:30 — Dinner, Roof Garden. (Informal.)
Tickets, $6.00 per person.

Tuesday

12:00 — Ladies' Luncheon, Mural Room, Baker Hotel.
Neiman Marcus Fashion Show.
Tickets, $4.00 per person.

Wednesday

10:00 to 12:00 — A Tour of Dallas.
Tickets must be obtained before 5:00 Tuesday at the registration desk on the mezzanine of the Baker Hotel.
Tickets, $2.00 per person.

6:30 — The President's Cocktail Party, Peacock Terrace of the Baker Hotel.
7:30 — The President's Dinner Dance, The Crystal Ball Room of the Baker Hotel. (Strictly informal.)
Tickets, $8.50 per person.

Entertainment for the Men (Robert E. Gaylord, chairman)

All social affairs strictly informal.

Sunday

6:30 to 8:00 — Cocktails and Buffet, Peacock Terrace of the Baker Hotel. (Informal.)
Tickets, $6.00 per person.

Monday

12:30 — The Golden Anniversary Luncheon.
The members of the American Association of Orthodontists, honoring our members who have been in the practice of dentistry fifty years or more.
Mural Room, Baker Hotel.
Tickets, $4.00 per person. (Guests invited.)

6:30 — Cocktails, Peacock Terrace of the Baker Hotel.
7:30 — Dinner, Peacock Terrace of the Baker Hotel.
Tickets, $7.50 per person.

Tuesday

12:30 — The International Luncheon, Peacock Terrace, Baker Hotel.
Tickets, $4.00 per person.

Wednesday

12:30 — The Past Presidents' Luncheon, English Room, Baker Hotel.

6:30 — The President's Cocktail Party, Peacock Terrace of the Baker Hotel.
8:30 — The President's Dinner Dance, Crystal Ball Room of the Baker Hotel. (Strictly informal.)
Tickets, $8.50 per person.

Local Committees for Dallas Meeting of American Association of Orthodontists

LOCAL ARRANGEMENTS

Tom M. Williams, Chairman
Medical Arts Bldg.
Dallas, Texas

Frank Roark, Treasurer
4150 Mockingbird Lane
Dallas, Texas

Bibb Ballard
A. B. Conly
W. Harrel Delafield
Joe Favors
Nathan G. Gaston
Robert E. Gaylord
G. A. McJimsey
Julius Tomlin
Horace E. Wood
William M. Younger

REGISTRATION

Franklin A. Squires, Co-chairman
W. Harrel Delafield
G. A. McJimsey
Frank Roark

Bibb Ballard, Co-chairman
Julius Tomlin
Horace E. Wood

INFORMATION

Horace E. Wood, Chairman

S. D. Terrell

G. C. Turner

RECEPTION

W. Harrel Delafield, Chairman

Robert W. Gaston
Walter Lipscomb

Hugh A. Sims
J. C. Williams

PRESS

Joe Favors, Chairman

G. A. McJimsey

J. A. Rowe

Harry H. Sorrels

Thermon B. Smith

EXHIBITS

Nathan G. Gaston, Chairman

J. E. O'Donnell

J. E. Roak

Horace E. Wood

CLINICS

Julius Tomlin, Chairman

John W. Conly
James C. Hart
Emily T. Hicks
T. M. Matthews

William M. Pugh
Lee O. Rogers
Frank Roark
Thermon B. Smith

W. Kenneth Thurmond
W. Wayne White

PROPERTY

Frank Roark, Chairman

John W. Conly
James C. Hart

Julius Tomlin
W. B. Stevenson, Jr.

LADIES ENTERTAINMENT

A. B. Conly, Chairman

W. Harrel Delafield
Robert E. Gaylord

G. A. McJimsey
Horace E. Wood

Hostesses

Mrs. Brooks Bell
Mrs. James W. Ford
Mrs. Clare K. Madden
Mrs. Franklin A. Squires
Mrs. Bibb Ballard
Mrs. A. B. Conly
Mrs. W. Harrel Delafield
Mrs. Joe Favors
Mrs. Robert E. Gaylord
Mrs. G. A. McJimsey
Mrs. Julius Tomlin
Mrs. Tom M. Williams
Mrs. Horace E. Wood

MEN'S ENTERTAINMENT

Robert E. Gaylord, Chairman

Bibb Ballard
A. B. Conly
Joe Favors
T. M. Matthews
Julius Tomlin

Tentative speakers at the meeting are as follows:

Spencer R. Atkinson. Early Treatment.

Ernest N. Bach. Incidence of Caries in Orthodontic Patients.

Henry Beyron, Stockholm. Aging Changes in Adult Dentition and the Preservation of Supporting Tissues.

Elena Boder, M.D. Facial Asymmetry in the Newborn Infant; Its Etiology and Orthodontic Significance.

Touro M. Garber. An Up-to-the-moment Review of the Clinical Adaptation of Cephalometry as a Diagnostic Aid.

L. B. Higley. Rational Approaches in Orthodontic Diagnosis.

Andrew F. Jackson. Are Multiple Bands Necessary in Orthodontic Treatment?

Robert E. Moyers' Group, Toronto. Intraoral Factors Affecting Case Assessment.

Shailer Peterson (A.D.A). Undergraduate and Graduate Orthodontic Education.

Note. Dr. Peterson is not quite certain that he can be with us. May have his associate, Dr. Casey, in his place.

H. C. Pollock. Orthodontic Trends.

J. A. Salzmann. General Growth Acceleration and Retardation in Relation to Dentofacial Development.

Arnold E. Stoller. The Normal Position of the Maxillary First Molar.

John R. Thompson. Normal and Abnormal Function of the Temporomandibular Joints.

Clifford L. Whitman. Habits Have Gotten to Be a Habit With Me.

S. Fastlicht, Mexico City. Treatment of Impacted Cuspids.

Symposium: Treatment of a Typical Distoclusion Case.

5 case reports—15 minutes each.

Edgewise Appliance. F. F. Schudy, Houston, Texas.

Universal Appliance. Donald C. MacEwan, Seattle, Wash.

Labio-Lingual Appliance. William H. Oliver, Nashville, Tenn.

Removable Appliance. Samuel D. Gore, New Orleans, La.

Twin-arch Appliance.

A.B.O. Exhibit, showing material submitted to the Board in 1952.

Also Research Session, Tuesday evening.

American Board of Orthodontics

The next meeting of the American Board of Orthodontics will be held at the Baker Hotel, Dallas, Texas, April 22 to April 26, 1953. Orthodontists who desire to be certified by the Board may obtain application blanks from the secretary, Dr. C. Edward Martinek, 661 Fisher Bldg., Detroit 2, Mich. To be considered at the Dallas meeting, all applications must be filed before March 1, 1953.

Prize Essay Contest, American Association of Orthodontists

Eligibility.—Any member of the American Association of Orthodontists; any person affiliated with a recognized institution in the field of dentistry as a teacher, researcher, undergraduate or graduate student shall be eligible to enter the competition.

Character of Essay.—Each essay submitted must represent an original investigation and contain some new significant material of value to the art or science of orthodontics.

Prize.—A cash prize of $500 is offered for the essay judged to be the winner. The committee, however, reserves the right to omit the award if in its judgment none of the entries is considered to be worthy. Honorable mention will be awarded to those authors taking second and third places. The first three papers will become the property of the American Association of Orthodontists and will be published. All other essays will be returned.

Specifications.—All essays must be typewritten on 8½ by 11 inch white paper, double-spaced with 1 inch margins, and composed in good English. Three copies of each paper, complete with illustrations, bibliography, tables, and charts must be submitted. The name and address of the author must not appear in the essay. For purposes of identification, the author's name, together with a brief biographical sketch which sets forth his or her dental and/or orthodontic training, present activity and status (practitioner, teacher, student, research worker, etc.), should be typed on a separate sheet of paper and enclosed in a sealed envelope. The envelope should carry the title of the essay.

Presentation.—The author of the winning essay will be invited to present it at the meeting of the American Association of Orthodontists to be held at the Baker Hotel, Dallas, Texas, April 26 to 30, 1953.

Judges.—The entries will be judged by the Research Committee of the American Association of Orthodontists.

Final Submission Date.—No essay will be considered for this competition unless received in triplicate at the following address on or before March 1, 1953: Dr. J. A. Salzmann, 654 Madison Ave., New York 21, N. Y.

ROBERT E. MOYERS, Chairman, Research Committee,
American Association of Orthodontists,
230 College St.,
Toronto 2 B, Canada.

University of Pennsylvania

The Thomas W. Evans Museum and Dental Institute of the School of Dentistry, University of Pennsylvania, Philadelphia, Pa., will give a postgraduate course on the philosophy and principles of the Universal appliance. The course will be conducted by Spencer R. Atkinson from April 13 to 18, 1953.

A course on the twin wire mechanism will be given by Joseph E. Johnson, April 6 to 10, 1953, at the University of Pennsylvania.

University of Washington, School of Dentistry, Department of Orthodontics

The University of Washington announces that it is receiving applications for its next graduate class in orthodontics, which will begin the latter part of September, 1953. This course leads to a Master of Science degree, or Certificate for qualified candidates. Additional information may be obtained by writing the Director of Graduate Dental Education, University of Washington, School of Dentistry, Seattle 5, Wash.

Pacific Coast Society of Orthodontists

The Twenty-third General Meeting of the Pacific Coast Society of Orthodontists was held Monday, Tuesday, and Wednesday, Feb. 23, 24, and 25, 1953, at the Palace Hotel, San Francisco, Calif.

First Day, Monday, Feb. 23, 1953 (Reuben L. Blake, Presiding)

MORNING SESSION

Registration, Second floor lobby.

Meeting called to order.

Address of welcome. Willard C. Fleming, Dean, College of Dentistry, University of California.

President's Address. Reuben Lloyd Blake, San Francisco, Calif.

Charge to New Members. Vernon L. Hunt, Eureka, Calif.

A Consideration of the Present-Day Use of the Twin Wire Mechanism After 25 Years of Use. Joseph E. Johnson, Louisville, Ky.

Extraoral Forces. Carl F. Bruggeman, Los Angeles, Calif.

Round-Table Discussions. Wendell L. Wylie, Chairman, San Franciso, Calif.

After the lunch there will be the opportunity for anyone attending the luncheon to discuss one of five topics with three authorities on the subject. Prompt arrival in the dining room will make it possible for you to make an early choice of topic and table. The topics of the leaders are as follows:

Occipital Anchorage. J. Rodney Mathews, George W. Hahn, and Carl F. Bruggeman.

Occlusal Equilibration. Roscoe L. Keedy, Albert C. Heimlich, and Donald C. MacEwan.

Clinical Importance of Tooth Form. Alton W. Moore, Arnold E. Stoller, and Robert D. Payne.

Appliance Principles and Design. Vernon L. Hunt, Cecil C. Steiner, Joseph E. Johnson, and Paul D. Lewis.

Growth and Treatment Response. Eugene E. West, Benjamin C. Ledyard, Robert M. Ricketts, and Clare K. Madden.

AFTERNOON SESSION

Report of the Necrology Committee. William S. Smith, San Francisco, Calif.

Selective Grinding—An Integral Part of Orthodontic Therapy. Albert C. Heimlich, Santa Barbara, Calif.

Appraisal of the Mandibular Retromolar Area. Ben C. Ledyard, San Jose, Calif.

Laminated Arch Technique—The Double Ribbon and Double Edgewise. Clarence W. Carey, Palo Alto, Calif.

Table Clinics to complement the preceding essay. (This Clinic will not be repeated at the General Clinic Session.) Clarence W. Carey, Director, Glen W. Foor, William E. Grenfell, Joseph B. Martinez, Robert B. Murray, and Norman S. Snyder.

Second Day, Tuesday, Feb. 24, 1953 (Ernest L. Johnson, Presiding)

MORNING SESSION

Surgical Correction of Mandibular Prognathism. (Two Surgical Approaches for the Correction of Mandibular Prognathism will be illustrated by colored motion pictures, one an ostectomy [removing a section from the body], and the other an osteotomy [bisecting the rami above the mandibular sulcus]. If possible, there will be patients present whose cases are completed, for your observation.) Sanford M. Moose, San Francisco, Calif., Clinical Professor of Oral Surgery, College of Physicians and Surgeons.

Lingual Inclination of the Buccal Surfaces of the Posterior Teeth. Robert D. Payne, Phoenix, Ariz.

Changes in the Temporomandibular Joint During Orthodontic Treatment. Robert M. Ricketts, Pacific Palisades, Calif.

Past Presidents' Luncheon.

AFTERNOON SESSION

Occlusion—Now You See It and Now You Don't. Arnold E. Stoller, Seattle, Wash.

The Treatment of Class II, Division 1 with the Twin Wire Mechanism. Joseph E. Johnson, Louisville, Ky.

Practice Management; Efficiency in Office Design; Organization and Operation; Simplified Treatment; Investments. V. Everett Hunt, Eureka, Calif., Vernon L. Hunt, Eureka, Calif., and Bernard Matzen, Napa, Calif.

Prosthetic Correction of Congenital and/or Acquired Cleft Palate and Facial Deformities. (Models and Slides Demonstrating the Principles Involved will be shown in the English Room.) Charles A. Lipp, Associate Professor of Denture Prosthesis and Oral Facial Prosthesis, Chairman of Section, Oral Facial Prosthesis, University of California, College of Dentistry, San Francisco, Calif.

THIRD DAY, WEDNESDAY, FEB. 25, 1953 (DAVID L. ENGLAND, PRESIDING)

MORNING SESSION

Group Clinics

Orthodontic Results at University of California Clinic, Wendell L. Wylie, Chairman.

Senior Students: Messrs. Allen E. Hom, Allen L. Lagier, Donald C. Noy, Lawrence G. Osborne, John C. Ray, and John E. Robson.

Anatomical Factors Guiding Treatment Therapy (by Graduate Faculty, University of Southern California), Spencer R. Atkinson, Chairman.

Ruth Allen, Jessie F. Gregory, William M. Jow.

Individual Tooth Movement by Mechanical Means (by Graduate Class, University of Southern California). R. Vaughn, P. Murphy, E. Donaldson, W. Dahlberg, J. Vale, H. Torres, T. Romero, C. Delio, L. Fairbanks, B. Sutton, and E. Eros.

Segmental Treatment of Class II, Division 2 (Universal Appliance). Pacific Northwest Orthodontic Study Society, George A. Barker, Chairman.

H. H. Bowman, United States Coast Guard, Richard E. Cline, Howard J. Hammond, James M. Keenan.

Treatment of Case With a Maxillary Protrusion and Mandibular Retraction Involving the Extraction of Four Bicuspids Using the Universal Appliance Reinforced by a Maxillary Headcap all Through Treatment. Robert J. Gawley, Chairman.

Sidney Cross, Fairman W. Fahrney, Robert A. Lee, Fred E. McIntosh, Ben L. Reese, and J. Clifford Willcox.

Cephalometrics in Clinical Practice. William W. Paden, Chairman.

Eugene E. West, Thomas E. Lewis, John E. Dumon, E. Wilden Ballard, John H. Sibley, and J. Rodney Mathews.

Practical Management. V. Everett Hunt, Chairman.

Vernon L. Hunt and Bernard Matzen.

Tweed's Application of Cephalometrics in Treatment Planning of Mixed and Permanent Dentition. Donald E. Priewe, Chairman.

Jack R. Smithers, Hugh Carpol, F. Barr Miller, Ivan F. Lee, and Donald M. Mathews.

General Clinics

Clinical Application of Extraoral Force. Carl F. Bruggeman.

Bite Raisers. Lloyd H. Chapman.

Occipital and Neck Anchorage Modified.

Rotating Teeth (a Simple Technique). Walter J. Furie.

History of the Orthodontic Appliance on Models. George R. Graeser.

A Simple Technique Proving the Ability of Twin Wire Mechanism to Move Maxillary Molars Either Mesially or Distally. Joseph E. Johnson and Clare K. Madden.

Anchorage. Donald C. MacEwan.

Variations in Extraoral Appliances. Dallas R. McCauley.

The Making of Illustrations. James D. McCoy.

Application of Contractile Coil Spring. George Y. Nagamoto.

Cervical Gears. William S. Parker.

Measurement of Lingual Inclinations of Posterior Teeth. Robert D. Payne.

Occlusion—Now You See It and Now You Don't. Arnold E. Stoller.

A Serial Study of Dental Development (Cases selected at random from a group study of children at the "Well Baby Clinic" at Mt. Zion Hospital in San Francisco.) Fred Wolfsohn, Chief Emeritus, Dental Service, Mt. Zion Hospital, San Francisco, Calif.

Lunch.

AFTERNOON SESSION

Principles and Clinical Application of Anchorage. Donald C. MacEwan, Seattle, Wash.

A Logical Approach to Retention. Paul D. Lewis, Seattle, Wash.

Today's Orthodontic Education. Eugene E. West, San Francisco, Calif.

Business Meeting. Installation of Arnold E. Stoller as president.

Adjournment.

Meeting of Board of Directors, Pacific Coast Society of Orthodontists.

Southern Society of Orthodontists

The next annual meeting of the Southern Society of Orthodontists will be held in Orlando, Fla., Nov. 1, 2, 3, and 4, 1953.

European Orthodontic Society

The European Orthodontic Societies Congress will be held at Monte-Carlo from May 10 to 14, 1953. The main subject at this meeting will be "Prognosis in Orthodontics."

Johnson Alumni Club

The Johnson Alumni Club met in Louisville, Ky., Jan. 19, 20, and 21, 1953.

There were three hundred registered including the orthodontists and their wives. The group in attendance was most diversified. There were three from Canada, three from Cuba, one from Israel, and one from Greece. The rest of the registration covered practically every state in the union.

The meeting opened Sunday night with a cocktail party at the home of Dr. and Mrs. Joseph E. Johnson. Monday, January 19, consisted of lectures and case reports and a luncheon at noon for the men and their wives with Willie Snow Ethridge of Louisville, famous author and lecturer. There were handsome door prizes for the ladies. Tuesday, January 20, consisted of lectures and case reports and a banquet in the evening honoring Dr. and Mrs. Joseph E. Johnson. Dr. John A. Atkinson was toastmaster and Dr. Frank A. Lamons presented Dr. and Mrs. Johnson with a book of five hundred congratulatory letters from various friends all over the world.

The newly elected officers are as follows: *President,* Dr. Earl Shepard, St. Louis, Mo. *Secretary-Treasurer,* Cecil G. Muller, Omaha, Neb.

Members of the board are Dr. Hewett Williams, Chicago, Ill., Dr. Clare K. Madden, Greenwich, Conn., and Dr. Roy T. Bovard, Coral Gables, Fla.

Notes of Interest

Frank P. Bowyer, D. D. S., announces the return of his associate, Thomas D. Pryse, D.M.D., from duty with the United States Air Force (Dental Corps), practice limited to orthodontics, at 608 Medical Arts Bldg., Knoxville, Tenn.

Dr. Eugene L. Gottlieb announces the removal of his office to Medical Bldg., 165 North Village Ave., Rockville Centre, N. Y., practice limited to orthodontics.

Dr. A. D. Mollin announces the opening of an additional office at 90 Main St., Port Washington, L. I.; Great Neck office, 260 Middle Neck Road.

Richard Pasternak, D. D. S., announces the removal of his office from 169 Fulton Ave., Hempstead, N. Y., to 58 Cathedral Ave., Hempstead, N. Y.

Dr. James T. Tonery announces his association with Dr. Nicholas A. Ippolito at One Hanson Place, Brooklyn 17, N. Y.

Tim Turner, D.D.S., M.Sc., announces the opening of his office at 1111 Victoria Ave., Niagara Falls, Canada, practice limited to orthodontics.

OFFICERS OF ORTHODONTIC SOCIETIES

The AMERICAN JOURNAL OF ORTHODONTICS is the official publication of the American Association of Orthodontists and the following component societies. The editorial board of the AMERICAN JOURNAL OF ORTHODONTICS is composed of a representative of each one of the component societies of the American Association of Orthodontists.

American Association of Orthodontists

President, Brooks Bell - - - - - - - - - - 4150 Mockingbird Lane, Dallas, Texas
President-Elect, James W. Ford - - - - - - - - 55 E. Washington St., Chicago, Ill.
Vice-President, Clare Madden - - - - - - - - 22 Lafayette Place, Greenwich, Conn.
Secretary-Treasurer, Franklin A. Squires - - - - - Medical Centre, White Plains, N. Y.

Central Section of the American Association of Orthodontists

President, G. Hewett Williams - - - - - - - - - - 4753 Broadway, Chicago, Ill.
Secretary-Treasurer, Frederick B. Lehman - - - - - - - 1126 Merchants Bank Bldg., Cedar Rapids, Iowa

Great Lakes Society of Orthodontists

President, Scott T. Holmes - - - - - - - - - - 1205 Peck St., Muskegon, Mich.
Secretary-Treasurer, Carl R. Anderson - - - - 402 Loraine Bldg., Grand Rapids, Mich.

Middle Atlantic Society of Orthodontists

President, Charles Patton - - - - - - - - - - 235 S. 15th St., Philadelphia, Pa.
Secretary-Treasurer, Gerard A. Devlin - - - - - - - - 49 Bleeker St., Newark, N. J.

Northeastern Society of Orthodontists

President, George S. Callaway - - - - - - - - - 654 Madison Ave., New York, N. Y.
Secretary-Treasurer, Oscar Jacobson - - - - - - - 35 W. 81st St., New York, N. Y.

Pacific Coast Society of Orthodontists

President, Arnold E. Stoller - - - - - - - - - Medical Dental Bldg., Seattle, Wash.
Secretary-Treasurer, Raymond M. Curtner - - - - - 450 Sutter St., San Francisco, Calif.

Rocky Mountain Society of Orthodontists

President, Kenneth R. Johnson - - - - - - - 303 N. Weber, Colorado Springs, Colo.
Secretary-Treasurer, Curtis L. Benight - - - - - - - 1001 Republic Bldg., Denver, Colo.

Southern Society of Orthodontists

President, Leland T. Daniel - - - - - - - - - 407-8 American Bldg., Orlando, Fla.
Secretary-Treasurer, M. D. Edwards - - - - - - - 132 Adams Ave., Montgomery, Ala.

Southwestern Society of Orthodontists

President, Clarence W. Koch - - - - - - - - - 817 Donaghey Bldg., Little Rock, Ark.
Secretary-Treasurer, Fred A. Boyd - - - - - - - 1502 North Third St., Abilene, Texas

American Board of Orthodontics

President, Leuman M. Waugh - - - - - - - - - - 931 Fifth Ave., New York, N. Y.
Vice-President, Raymond L. Webster - - - - - - 133 Waterman St., Providence, R. I.
Secretary, C. Edward Martinek - - - - - - - - - - 661 Fisher Bldg., Detroit, Mich.
Treasurer, Lowrie J. Porter - - - - - - - - - - 41 East 57th St., New York, N. Y.
Director, Ernest L. Johnson - - - - - - - - - - 450 Sutter St., San Francisco, Calif.
Director, William E. Flesher - - - - - - - - Medical Arts Bldg., Oklahoma City, Okla.
Director, Max E. Ernst - - - - - - - - - Lowry Medical Arts Bldg., St. Paul, Minn.

There is an apparent discrepan

The pages are either missing o

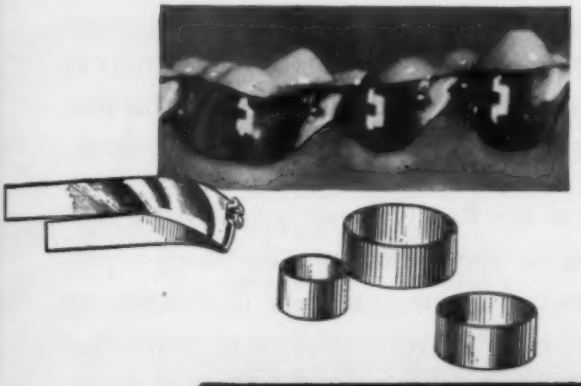
The filming is recorded as the

ıncy at this point.

or the pagination is incorrect.

e book is found in the collections.

...unmatched "edge-strength" with – ADERER'S TEMPERABLE BAND MATERIAL



ADERER'S Temperable Band Material is a most unusual product. It is made of a special Aderer precious metal alloy that is extremely soft and pliable in its annealed state but has exceptional edge strength (without being brittle) when the case is tempered.

It is a wonderful band material to work with . . . for easiest fabrication . . . for strength without bulk.

Aderer Temperable Band Material is available in all popular band sizes—in 24 sizes of seamless molar bands and in contoured band strips for molar, cuspid and anterior, made to the specification of Dr. William Downs.

Aderer Temperable Band Material is a platinum-gold alloy, with a fusing point of 2240 F. Its specific gravity is so low that you receive approximately twice the amount of material per dwt. It is therefore also a most economical material to use.

ADERER GOLDS

Julius Aderer, Inc., New York · Chicago

219 EAST 44th STREET, NEW YORK CITY ★ 55 EAST WASHINGTON STREET, CHICAGO

The American National Red Cross

EVERY month in the year thousands of people in need or distress reach out to the Red Cross for the help they must have, help that comes from the generous efforts and support of housewives, businessmen, industrial workers, school children, professional workers—your next door neighbors—and countless others who serve their fellow man through the Red Cross.

In a time of tension and cynicism it is well to be reminded of the inherent goodness of people, to call attention to their constant voluntary efforts to make life a little better for the men and women in the armed forces, for hospitalized veterans, for disaster sufferers, and for those in need in other lands.

Although the heart and hands of the Red Cross are provided by hundreds of thousands of volunteers, money is also needed to collect blood; to provide financial assistance for servicemen, veterans, and their dependents; to furnish emergency aid and rehabilitation to disaster victims—services that can be provided only through the voluntary financial support of millions of Americans.

Every March Red Cross volunteers turn to their neighbors and ask help in answering the call of those in need. Let us respond generously to this appeal so that we can answer the call of humanity through our Red Cross.

A MODERN DENTAL REFERENCE LIBRARY

PERIODONTIA—A Study of the Histology, Physiology, and Pathology of the Periodontium, and the Treatment of Its Diseases. By HENRY M. GOLDMAN, D.M.D., SECOND EDITION. 661 pages, 488 illustrations, 18 in color. PRICE, $12.50.

BIOCHEMISTRY OF THE TEETH—By HENRY M. LEICESTER, Ph.D., 306 pages, illustrated. PRICE, $5.50.

OUTLINE OF HISTOLOGY—By MARGARET M. HOSKINS, Ph.D., and GERRITT BEVELANDER, Ph.D., SECOND EDITION. 112 pages, illustrated. Size: 9x11-in. PRICE, $3.50.

DENTAL CARIES—Mechanism and Present Control Technics as Evaluated at the University of Michigan Workshop. Edited by KENNETH A. EASLICK, A.M., D.D.S., 234 pages, illustrated. PRICE, $5.50.

RESTORATIVE DENTISTRY—By JEROME M. SCHWEITZER, B.S., D.D.S., 511 pages, 1014 illustrations. PRICE, $16.00.

ORAL REHABILITATION—By JEROME M. SCHWEITZER, D.D.S. 1161 pages, 1157 illustrations. PRICE, $21.00.

BONE AND BONES—Fundamentals of Bone Biology. By JOSEPH P. WEINMANN, M.D., and HARRY SICHER, M.D., 464 pages, 289 illustrations. PRICE, $10.00.

DENTAL PROSTHETIC LABORATORY MANUAL—By CARL O. BOUCHER, D.D.S., 410 pages. PRICE, $4.75.

COMPLETE DENTURES—By MERRILL G. SWENSON, D.D.S., F.I.C.D., F.A.C.P., 726 pages, 882 illustrations, 10 in color. PRICE, $13.50.

ORAL SURGERY—By KURT H. THOMA, D.M.D., SECOND EDITION IN TWO VOLUMES, 1688 pages, 1789 illustrations, 121 in color. PRICE, $30.00.

ORAL PATHOLOGY—By KURT H. THOMA, D.M.D., THIRD EDITION. 1559 pages, 1660 illustrations, 78 in color. PRICE, $17.50.

ANESTHESIA IN DENTAL SURGERY—By STERLING V. MEAD, D.D.S., SECOND EDITION. 638 pages, 223 illustrations. PRICE, $12.50.

BASIC PRINCIPLES AND TECHNICS FOR COMPLETE DENTURE CONSTRUCTION—By VICTOR H. SEARS, D.D.S. 416 pages, illustrated. PRICE, $5.50.

PHARMACOLOGY AND DENTAL THERAPEUTICS—By EDWARD C. DOBBS AND HERMANN PRINZ. TENTH EDITION. 599 pages, 35 illustrations. PRICE, $9.00.

Theory and Practice of CROWN AND BRIDGE PROSTHESIS—By STANLEY D. TYLMAN, A.B., D.D.S., M.S., F.A.C.D., SECOND EDITION. 960 pages, 1273 illustrations, 9 in color. PRICE, $13.50.

PRACTICAL ORTHODONTICS—(Original Text by the Late Martin Dewey) By GEORGE M. ANDERSON, D.D.S., SEVENTH EDITION 556 pages, 640 illustrations. PRICE, $10.50.

ORAL PHYSIOLOGY—By JOHN T. O'ROURKE, B.S., D.D.S., Sc.D., and edited by LEROY M. S. MINER, M.D., D.M.D., Sc.D., Dr.P.H. 333 pages. PRICE, $5.50.

ORAL HISTOLOGY AND EMBRYOLOGY—Edited by BALINT ORBAN, M.D., D.D.S., SECOND EDITION, 350 pages, 265 illustrations, 4 in color. PRICE, $8.50.

ORAL ANATOMY—By HARRY SICHER, M.D., SECOND EDITION, 529 pages, 310 illustrations, 24 in color. PRICE, $13.50.

DENTAL ANATOMY—By ROBERT C. ZEISZ, D.D.S., F.A.C.D., F.I.C.S., and JAMES NUKOLLS, D.D.S., F.A.C.D., 486 pages, 427 illustrations. PRICE, $10.00.

ADVANCED RADIODONTIC INTERPRETATION—By CLARENCE O. SIMPSON, M.D., D.D.S., F.I.C.D., 78 pages, 150 illustrations on 10 full page inserts. PRICE, $10.50.

REVIEW OF DENTISTRY—Edited by JAMES T. GINN, B.S., D.D.S., 824 pages. PRICE, $6.25.

DOCTOR AND PATIENT AND THE LAW—By LOUIS J. REGAN, M.D., LL.B., SECOND EDITION. 545 pages. PRICE, $10.50.

An Introduction to the HISTORY OF DENTISTRY—By BERNHARD WOLF WEINBERGER, D.D.S., IN TWO VOLUMES. 1008 pages, 313 illustrations. PRICE, $12.50

ESSENTIALS OF ORAL SURGERY—By V. P. BLAIR, M.D., F.A.C.S., and ROBERT H. IVY, M.D., D.D.S., F.A.C.S. Collaboration of JAMES BARRETT BROWN, M.D., F.A.C.S., FOURTH EDITION. 635 pages, 485 illustrations. PRICE, $8.50.

DISEASES OF THE MOUTH—By STERLING V. MEAD, D.D.S., FIFTH EDITION. 1050 pages, 633 illustrations, 63 in color. PRICE, $13.50.

ORAL SURGERY—By STERLING V. MEAD, D.D.S., THIRD EDITION. 1448 pages, 805 illustrations, 16 color plates. PRICE, $15.00.

PHYSIOLOGICAL FOUNDATION OF DENTAL PRACTICE—By L. L. LANGLEY and E. CHERASKIN. 512 pages, 149 illustrations. PRICE, $8.75.

The C. V. Mosby Co., Publishers, St. Louis 3, Mo.

INDEX TO ADVERTISERS

Please mention "American Journal of Orthodontics" when writing to our advertisers—it identifies you

Aderer, Inc., Julius ---------- 13
American National Red Cross, The ---- 14
Association Available Orthodontist ---- 8
Association Available Orthodontist Part-Time ---------- 8
Association Wanted Orthodontist ------ 8

Baker & Company, Inc. ---------- 1
Betta Orthodontic Supplies ---------- 3
Bi-Po Company ---------- 6
Bound Volumes ---------- 16

Easter Seals ---------- 10

Handy & Harman Dee Products ------ 9

LaPorte Tooth Positioning Laboratories 5
Location Available Orthodontist ------ 8

Orthodontic Practice Available -------- 8
Orthodontic Specialty Laboratory ----- 8

Rocky Mountain Metal Products Company ---------- 11, 12

Stratford-Cookson Company ---------- 6

Temple University—Course in Clinical Occlusion ---------- 8

Unitek Corporation ---------- 4

White Dental Mfg. Company, The S. S. ---------- Fourth Cover
Wilkinson Company, The ---------- 7
Williams Good Refining Co., Inc. ----- ---------- Second Cover

BOUND VOLUMES

•

Arrangements have been made for our readers to have their issues of this journal bound carefully and economically in our Authorized Binding. Simply write for details to—

CVDS

Box 776

HIGHLAND PARK, ILLINOIS

A STATEMENT OF ADVERTISING PRINCIPLES

1. GOOD ADVERTISING aims to inform the consumer and help him to buy more intelligently.
2. GOOD ADVERTISING tells the truth, avoiding misstatement of facts as well as possible deception through implication or omission. It makes no claims which cannot be met in full and without further qualification. It uses only testimonials of competent witnesses.
3. GOOD ADVERTISING conforms to the generally accepted standards of good taste. It seeks public acceptance on the basis of the merits of the product or service advertised rather than by the disparagement of competing goods. It tries to avoid practices that are offensive or annoying.
4. GOOD ADVERTISING recognizes both its economic responsibility to help reduce distribution costs and its social responsibility in serving the public interest.

AMERICAN JOURNAL OF ORTHODONTICS

Published by THE C. V. MOSBY COMPANY, 3207 Washington Blvd.
St. Louis 3, U. S. A.

Entered at the Post Office at St. Louis, Mo., as Second-class Matter

Published Monthly. Subscriptions may begin at any time.

Official Publication of The American Association of Orthodontists, its component societies and The American Board of Orthodontics

Editor-in-Chief

H. C. Pollock

Sectional Editors

Charles R. Baker, Evanston, Ill.
Henry Cossitt, Toledo, Ohio
Joseph D. Eby, New York City
Henry F. Hoffman, Denver, Colo.
James D. McCoy, Beverly Hills, Calif.
Oren A. Oliver, Nashville, Tenn.
William E. Flesher, Oklahoma City, Okla.

Associate Editors

Dentistry for Children
Walter T. McFall, Asheville, N. C.

Abstracts and Reviews
J. A. Salzmann, New York City

EDITORIAL COMMUNICATIONS

Original Communications.—Manuscripts for publication and correspondence relating to them should be sent to Dr. H. C. Pollock, 8015 Maryland Ave., St. Louis 5, Mo., U. S. A.

Manuscripts should be typewritten on one side of the paper only, with double spacing and liberal margins. References should be placed at the end of the article and should include, in the order given, name of author, title, journal, volume, pages, and year; e.g., Smith, E. J.: Children's Dentistry, Am. J. Orthodontics, 34: 1-25, 1947. Illustrations accompanying manuscripts should be numbered, provided with suitable legends, and marked on margin or back with author's name. Articles accepted for publication are subject to editorial revision. Neither the editors nor the publishers accept responsibility for the views and statements of authors as published in their "Original Communications."

Illustrations.—A reasonable number of half-tone illustrations will be reproduced free of cost to the author, but special arrangements must be made with the editor for color plates, elaborate tables, or extra illustrations. Copy for zinc cuts (such as pen drawings and charts) should be drawn and lettered only in India ink, or black typewriter ribbon (when the typewriter is used), as ordinary blue ink or colors will not reproduce. Only good photographic prints or drawings should be supplied for half-tone work.

Books for Review.—Only such books as are considered of interest and value to subscribers will be reviewed, and no published acknowledgment of books received will be made. These should be sent to Dr. J. A. Salzmann, 654 Madison Ave., New York City.

Reprints.—Reprints of articles published among "Original Communications" must be ordered specifically, in separate communication to the publishers, The C. V. Mosby Company, 3207 Washington Blvd., St. Louis 3, Mo., U. S. A., who will send their schedule of prices. Individual reprints of an article must be obtained through the author.

BUSINESS COMMUNICATIONS

Business Communications.—All communications in regard to advertising, subscriptions, change of address, etc., should be addressed to the publishers, The C. V. Mosby Company, 3207 Washington Blvd., St. Louis 3, Mo.

Subscription Rates.—Single copies, $1.10. In the United States and other countries of the U. S. Postal Zone $10.00 per year in advance. In Canada and other foreign countries $11.00, single copies $1.20.

Remittances.—Remittances for subscriptions should be made by check, draft, post-office or express money order, payable to the publishers, The C. V. Mosby Company.

Change of Address.—The publishers should be advised of change of subscriber's address about fifteen days before the date of issue, with both new and old addresses given.

Advertisements.—Only articles of known scientific value will be given space. Forms close first of month preceding date of issue. Advertising rates and page sizes on application.

Bound Volumes.—The Book Shop Bindery, 308 West Randolph Street, Chicago 6, Illinois, will be glad to quote prices for binding complete volumes in permanent buckram.

S·S·White PRECIOUS METAL WIRES for Arches and Springs

NO. 61 METALBA—Platinum Color

A high-grade, exceptionally strong, tough, springy wire. No. 61 Metalba is the highest grade orthodontic wire of our manufacture. It is high fusing, and maintains its high physical properties after soldering operations.

$3.90 per dwt.

GOLD PLATINUM—Gold Color

Gold Platinum Wire has been proving its merits for all types of arches and springs for more than a quarter century. It's easy working, strong, tough, springy, and doesn't "tire" or lose its elasticity while orthodontic treatments are in progress.

$3.00 per dwt.

NO. 12 CLASP

A high grade wire with physical properties that rival closely those of the highest priced orthodontic wires. It's almost as strong as the strongest, moreover, it is very tough and elastic, and an exceptional arch wire.

$2.80 per dwt.

S. S. WHITE METALBA BRAND BAND MATERIAL

A high-fusing, non-tarnishing all precious metal, medium hard band material, costing little more than base metal products. It's easy working, tough, and has good strength—sufficient for all orthodontic purposes. Metalba Band Material requires no particular heat treatment. It is high fusing and gold solder of any fineness may be used with it.

$2.40 per dwt.

ALL MADE IN POPULAR GAGES AND WIDTHS

Prices subject to change

THE S. S. WHITE DENTAL, MFG. CO., 211 S. 12th STREET, PHILADELPHIA 5, PA.